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No. 4



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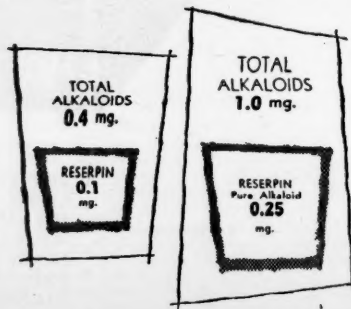


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### THE PROBLEM OF THE ISO-IMMUNIZED RH-NEGATIVE MOTHER.<sup>1</sup>

By J. GRANTLEY SHELTON, M.B.E., M.B., B.S., M.R.C.O.G.,<sup>2</sup>  
Melbourne.

It is with pleasure that we have been able to observe at the Royal Women's Hospital, Melbourne, the specialized care of the Rhesus-negative mother develop since 1950 from little more than the hobby stage to the present highly organized cooperative effort. Dr. Vera Krieger has for many years been engaged in research work on the serological side of this problem, but until comparatively recent times there had been no attempt at an organized clinical application of these investigations.

We now consider that no investigation of the problem of the immunized Rh-negative mother is complete unless it is a cooperative effort involving at least the following four people: (i) an obstetrician, who is responsible for the ante-natal welfare and obstetric care of the patients; (ii) a paediatric physician, whose policy with regard to the treatment of the erythroblastotic babies must be definite, laid

down, and carried out by all those under his direction; (iii) a person or persons willing to interest themselves in the not difficult but rather intricate operation of exchange transfusion; (iv) a reliable and experienced serologist.

Such a team has been working now in the Royal Women's Hospital for a period of three years under the direction and with the encouragement of the Professor of Obstetrics in the University of Melbourne, and in this paper are presented the results in a series of 146 immunized mothers observed by the team during 1952 and 1953.

Since the discovery of the Rhesus factor in America in the early 1940's, there has been an enormous amount of literature published on the subject, but most of it has been written by serologists or paediatricians. Search as one may, it is difficult to find anything much published by an obstetrician; yet this is a serious obstetric problem. One in seven of the patients who attend the ante-natal clinics at the Royal Women's Hospital is an Rh-negative mother. Approximately 10% of these patients become immunized; therefore one in 70 of our patients is an immunized Rh-negative mother. This figure is higher than that quoted in most hospitals, where the figure given is approximately one in 100. If as obstetricians you are called upon to conduct 300 midwifery cases a year—and that is a big practice—you must be prepared to care for three or four immunized mothers each year. The correct management of these patients may mean the difference between a live, healthy baby and an obstetric disaster.

<sup>1</sup>Read at a meeting of the Victorian Branch of the British Medical Association on April 6, 1955.

<sup>2</sup>Based on work done during the tenure of a grant from the National Health and Medical Research Council.

It is unforgivable in these enlightened days for a patient to go through pregnancy without routine blood tests. If she is found to be an immunized Rh-negative mother, arrangements should be made for delivery in an institution capable of handling the baby, and the correct people should know that she is in labour and should be present at the delivery or soon after. They should not be asked to examine the patient next day or a few hours later, when an otherwise salvageable baby may be jaundiced and doomed to disaster.

The best overseas work on this subject has been done in Boston, United States of America, by Diamond and his associates working at the Boston Lying-In Hospital and the Children's Hospital, and in England by Mollison and Walker and their associates; but in both cases the research programmes have consisted of a study of the outcome in a series of erythroblastotic babies—a paediatric problem. We have tackled the problem in a slightly different way by collecting from the routine ante-natal clinics at the Royal Women's Hospital a series of immunized mothers, and have attempted to observe the outcome of every one of these pregnancies. This, of course, has also been done before—for example, by Murray and Taylor (1949) in London, who published a paper concerning a series of 64 immunized mothers.

The cases we collected were managed by me during the ante-natal period in a special clinic conducted in the professorial unit. They do not include every known iso-immunized patient booked at the hospital, and of course they do not include any non-booked patients admitted to hospital for delivery.

The object of this clinic was not in any way an attempt to cut down the stillbirth rate, which most of the great obstetric centres of the world now accept as inevitable. However, the object of our clinic was an attempt to assist the paediatricians in their fight to cut down the foetal mortality rate of the live-born infant, and particularly in their fight to cut down the incidence of kernicterus in the live-born infant. "Kernicterus" is a bad term—a pathological term which has come to be used clinically, and which means brain damage in the jaundiced infant. The greatest weapon we have against kernicterus is exchange transfusion, although obstetricians still meet experienced paediatricians who are not completely convinced of this idea. However, the two centres mentioned above are convinced that exchange transfusion is the correct treatment of erythroblastosis in all those cases in which the indications laid down exist.

As an obstetrician, I have attempted to work out some correlation between the following three possible ante-natal factors and the outcome for the live-born infant: (i) maternal history, (ii) maternal antibody titre, (iii) period of gestation.

#### Maternal History.

Every endeavour has been made to obtain accurate histories of previous pregnancies. We have consulted records and written many letters to private doctors and to other hospitals, particularly the Royal Children's Hospital, whose friendly cooperation we greatly appreciated.

#### Maternal Antibody Titre.

Maternal antibody titres were recorded after the first visit and repeated at thirty weeks and thirty-seven weeks. The antibody test used was the serum-albumin test. Dr. Vera Krieger later in this meeting will discuss the methods of testing for antibodies and the clinical significance of the results given by this method, and also the more time-consuming and difficult test—the indirect Coombs or standardized indirect antiglobulin test.

Wherever possible the husband's genotype has been worked out. (This, incidentally, need not be done as a routine in the case of Rh-negative mothers, unless they are immunized mothers.) However, it is my opinion that many marriages are incorrectly branded as hopelessly incompatible on the husband's test. We can quote several cases in which mothers with bad histories and so-called homozygote husbands produced Rh-negative babies.

#### Period of Gestation.

With regard to the period of gestation, we are convinced in our hospital that prematurity is the best friend of kernicterus, and that the correct way to manage the pregnancy of an immunized mother is not to induce labour some weeks before term. Our original intention was to divide all the patients into three groups and attempt to deliver as many as possible at thirty-six, thirty-eight and forty weeks and compare the results. So convinced were we by overseas workers that the thirty-six weeks babies would do badly that we eventually decided to attempt to induce labour in half the cases at thirty-eight weeks and in the other half at forty weeks, according to a randomized arrangement worked out by a statistician. Premature labour was induced by artificial rupture of the membranes. We attempted to show that just as many live healthy babies were produced amongst the forty weeks and over group as amongst the others. If a baby is so badly affected *in utero* that it will die if labour is not induced before term, it will almost certainly die soon after delivery if labour is induced early, or worse, it will almost certainly develop kernicterus.

#### Results.

The conditions laid down by our paediatric director for the treatment of all the babies delivered alive from our immunized mothers were as follows: (i) A paediatric registrar was present at the delivery. (ii) The baby was tested immediately after birth for its Rh status and a Coombs test was performed irrespective of the baby's appearance. (iii) If the haemoglobin level was below 14.8 grammes per 100 cubic centimetres (approximately 100%), a routine exchange transfusion was carried out. The method used was that of inserting a polythene catheter into the umbilical vein. (iv) If the haemoglobin value was above this level, the baby was observed for any signs of jaundice within eight hours. If these appeared, again a routine exchange transfusion was carried out.

The results of 146 pregnancies in immunized mothers were as follows: 103 infants (71%) lived; seven (5%) were born alive, but died within one day; 31 (20%) were still-born; there were six abortions (4%).

The figure of 103 living babies includes the Rh-negative babies, of whom there were 24, and those few babies who were suspected of suffering from kernicterus. From the obstetrician's point of view they are all the babies eventually discharged from hospital as living children, with instructions to return to the paediatric follow-up clinic. The seven babies who died within one day all died despite exchange transfusion. The stillbirth figure (31) is similar to that quoted in most papers. The six mothers who aborted were all interviewed by me in early pregnancy, and careful histories were taken. Abortion subsequently occurred.

TABLE I.  
The Live-Born Babies of 109 Immunized Mothers.

Rh Status.	Number of Cases.
Rh-positive babies:	
Coombs test result positive, child clinically affected .. .. .	68
Coombs test result positive, child clinically unaffected .. .. .	16
Coombs test result negative .. .. .	2
Rh-negative babies .. .. .	24
Total .. .. .	110

The 68 babies first mentioned in Table I gave positive results to the Coombs test and were affected clinically according to our standards mentioned above. Sixty-three of them were treated with exchange transfusion, including two who received a second exchange transfusion. The other five were incorrectly treated owing to administrative difficulties; one of these babies unfortunately died, and



provides one of the tragedies of our series. The second group of Rh-positive babies were treated conservatively. The third group of Rh-positive babies required no treatment. All the Rh-negative babies left hospital alive and well.

TABLE II.  
Relation to Maternal History of Outcome of 146 Pregnancies in Immunized Mothers.

Rh Status of Babies.	Maternal History.		
	No Transfusions or Previous Baby with Erythroblastosis.	Previous Baby with Erythroblastosis.	Rh-Positive Transfusion: No Previous Baby with Erythroblastosis.
Rh-positive babies:			
Lived			
Live-born but died in one day	40	36	3
Stillborn	4	3	—
Aborted	3	24	3
	1	4	1
Rh-negative babies: lived	—	24	—
Total	48	91	7

We are particularly pleased with the number of live babies in the second column of Table II (60). You will note that among patients with a history of a previous erythroblastotic baby there is one chance in four of an Rh-negative baby. The stillbirth rate in this second column is 24 out of 91, compared with three out of 48 in the first column. You will note that of the seven people immunized by transfusion, one aborted and three had stillborn babies.

TABLE III.  
Relation to Maternal Antibody Titre of the Outcome of 146 Pregnancies in Immunized Mothers.

Rh Status of Babies.	Maternal Antibody Titre.				
	Highest Ante-natal Titre 1 in 16.	Titre 32 to 64.	Titre 128 to 256.	Titre 512 to 1024.	Titre 2048 to 4096.
Rh-positive babies:					
Lived	10	12	37	18	2
Live-born but died in one day	—	—	1	5	1
Stillborn	—	—	7	16	8
Aborted	2	—	—	4	—
Rh-negative babies	3	9	5	5	2
Total	15	21	50	48	13

Titre values proved disappointing with regard to prognosis, but not useless as some authorities state. The figures in Table III show the highest titre recorded during the ante-natal period in each case, and I think disprove the statement that titre values are useless. It has been our experience that titre values do not allow the obstetrician to divide his cases into neat clinical groups, for they let him down badly in one direction—they are unable to indicate that the baby is an Rh-negative baby. This, of course, is a happy result when all are keyed up with expectation. The statement we now make is that in those cases in which the titre value is high or rising, the baby will almost certainly be affected clinically and require exchange transfusion, provided it is an Rh-positive baby.

You will note that the proportion of live babies increases as the titre value falls (the Rh-negative babies are included). The stillbirth rate increases as the titre value rises.

TABLE IV.  
Relation of Outcome of 146 Pregnancies to Period of Gestation.

Rh Status of Babies.	Period of Gestation.			
	Forty Weeks or More.	Thirty-eight Weeks or Less.	Thirty-six Weeks or Less.	Total.
Rh-positive babies:				
Lived	41	35	3	79
Live-born but died in one day	2	5	—	7
Stillborn	9	9	13	31
Rh-negative babies	14	10	—	24

Amongst the 79 babies that lived, 41 were delivered at term and 38 at thirty-eight weeks or less. In other words, our experience shows that there is no advantage in early induction of labour in the immunized mother. Out of seven babies that died despite exchange transfusion, five were delivered at thirty-eight weeks or less, and of three babies with kernicterus still living, all were delivered after premature induction of labour.

We had the assistance of the statistician in working out Table IV and arranging those few patients who were delivered between the period of thirty-eight and forty weeks. A period of forty-eight hours either side of the mark was taken as normal, and fortunately most patients being *multigravida* came into labour as desired. All patients delivered by Caesarean section for obstetrical reasons were excluded from the series.

#### Conclusion.

In the special clinic we also saw some interesting problems in which the Rhesus factor had been erroneously blamed for past obstetrical disaster. It is well to question any history of previous erythroblastosis until one is sure that the mother is an immunized mother during the pregnancy under management. I have yet to see an erythroblastotic baby delivered from a mother whom our serologist has branded as a non-immunized mother. I have, on the other hand, not seen a salvageable baby delivered from a mother who previously had a baby correctly diagnosed as affected by *hydrops fetalis*, except when the subsequent baby was Rh-negative. Herein lies the hope for the mother with the bad obstetric history.

It is the obstetrician who is usually consulted about future pregnancies. Advice in this direction is a big responsibility, and in the past much harm has been done by doctors giving incorrect advice. The lay Press also has tended to frighten people who find that they are Rh-negative.

In the light of our present knowledge there is unfortunately nothing that can be done to prevent fetal death *in utero* in 20% of immunized Rh-negative mothers; but we as obstetricians can do a great deal to help prevent the wastage which still exists amongst salvageable babies.

#### References.

- DIAMOND, L. K., VAUGHAN, V. C., and ALLEN, F. H. (1950), "Problems in the Interpretation of Changing Mortality in Erythroblastosis", *Pediatrics*, 6: 173.
- DIAMOND, L. K., VAUGHAN, V. C., and ALLEN, F. H. (1950), "Erythroblastosis Fetalis: Prognosis in Relation to History, Maternal Titre and Length of Fetal Gestation", *Pediatrics*, 6: 441.
- DIAMOND, L. K., VAUGHAN, V. C., and ALLEN, F. H. (1950), "Erythroblastosis Fetalis: Prognosis in Relation to Clinical and Serologic Manifestations at Birth", *Pediatrics*, 6: 630.
- DIAMOND, L. K., VAUGHAN, V. C., and ALLEN, F. H. (1950), "Erythroblastosis Fetalis: Further Observations on Kernicterus", *Pediatrics*, 6: 706.

- MOLLISON, P. L., and WALKER, W. (1952), "Controlled Trials of the Treatment of Hemolytic Disease of the Newborn", *Lancet*, 1: 429.
- MOLLISON, P. L., and ARMITAGE, P. (1953), "Further Analysis of Controlled Trials of Treatment of Hemolytic Disease of the Newborn", *J. Obst. & Gynaec. Brit. Emp.*, 60: 605.
- MURRAY, J., and TAYLOR, M. (1949), "Rh Immunization in Pregnancy", *J. Obst. & Gynaec. Brit. Emp.*, 56: 741.

### FETAL ERYTHROBLASTOSIS.<sup>1</sup>

By KATE I. CAMPBELL, C.B.E., M.D., B.S.,  
Melbourne.

THIS investigation was undertaken primarily to note the effect of induction of labour at thirty-eight weeks and at term on the infants of Rh-negative mothers who were found to have Rh-antibodies during pregnancy. The results have been dealt with in a previous paper by Dr. J. Grantley Shelton.

This communication is a presentation of the paediatric material.

It is well appreciated that in fetal erythroblastosis the two big dangers to the infant are anaemia and kernicterus, and while these usually occur together they also are found separately. Of the two conditions anaemia is much the less dangerous, as it is a reversible and therefore a treatable condition, whereas well established kernicterus is irreversible, resulting in death, or in a living child with varying degrees of cerebral damage.

Since severe jaundice is the forerunner of kernicterus, it follows that if we are to prevent death or damage from this complication, we must so treat the infant that he is not allowed to develop severe jaundice. A prerequisite to treatment, then, is the ability to detect as early as possible the baby who may subsequently develop severe jaundice.

It would be helpful if this point could be decided in the ante-natal period. While it is true that in general, if cases are taken in groups, the more severely affected groups have the highest maternal antibody titres, this is not true of individual cases. Cases occur in which the antibody titre has been so weak as to be disregarded, yet the infant has died of kernicterus. Conversely, cases occur in which the mother is found to have a rising antibody titre and gives birth to an Rh-negative infant. We must conclude that it is not possible to foretell before birth the severity of the disease in the infant.

After birth we are able to foretell the infant who will be severely affected (a) by the infant's condition, (b) by the findings in the cord blood, and (c) by the time of onset of the jaundice.

The infant's condition at birth may give ample evidence of severity because of the presence of pallor, ecchymoses and hemorrhagic condition, gross hepatosplenomegaly and oedema. However, it is common knowledge that an infant may be born in good condition with a high haemoglobin value and may subsequently die of gross kernicterus.

With regard to the cord blood findings, a positive Coombs test response will indicate an affected infant, but not the degree of severity of the affection. A low cord blood haemoglobin value will indicate the severity of the hemolytic process, but not the degree of potential liver and brain damage. A high cord blood bilirubin content is an indication of liver insufficiency and potential kernicterus.

The time of onset of the jaundice is an important finding. The earlier the onset, the more ominous is the outlook. An onset within eight hours (and indeed within twelve hours) is always dangerous and an indication of potential kernicterus.

In this series we adopted as criteria for potentially severe cases the British standards—namely, infants giving a positive response to the Coombs test in whose cord blood at

birth the haemoglobin value was under 14.8 grammes per 100 cubic centimetres (100%), or in whom jaundice appeared within eight hours of birth. Treatment of these patients was by exchange transfusion, the amount aimed at being 80 cubic centimetres per pound of the infant's body weight. The results were as follows.

There were 110 live-born infants (including one set of twins); 86 (78%) were Rh-positive and 24 (22%) Rh-negative. Of 86 Rh-positive infants, 68 (79%) were clinically affected and 18 (21%) were clinically unaffected.

The result of the Coombs test was positive in 84 (97.6%); 68 (80%) of these babies were clinically affected and 16 (20%) were clinically unaffected. The result of the Coombs test was negative in two (2.3%).

### Blood Transfusion.

Blood transfusions were given as shown in Table I.

TABLE I.

Type of Transfusion.	Rh-Positive Infants (86).	Affected Infants (68).
Exchange ..	62 (72.0%)	62 (91.0%)
Simple ..	2 (2.3%)	2 (3.0%)
None ..	22 (25.6%)	4 (6.0%)

### Kernicterus.

The occurrence of kernicterus was as shown in Table II.

### Deaths.

Of the 86 Rh-positive infants, nine (8.2%) died. Of the 68 clinically affected infants, seven (11%) died.

TABLE II.

Survival.	Rh-Positive Infants (86).	Infants Treated According to Scheme (63). <sup>1</sup>
Babies alive ..	3	3
Babies dead ..	2	0
Total ..	5 (5.8%)	3 (4.8%)

### Analysis of Affected Infants.

The following is an analysis of the 68 affected infants, including 63 treated according to the scheme and five not so treated, in relation to the haemoglobin value in the cord blood (see Table III).

In the 14.8 grammes *per centum* (100%) and over haemoglobin value group of 27 babies, eight developed jaundice within eight hours and required exchange transfusion; the remainder required no treatment. We may deduce that in this series an infant with a cord blood haemoglobin value of 100% or more who did not show jaundice within eight hours required no treatment. One infant in this group who was not treated according to the scheme developed jaundice at two hours and died at four days of kernicterus.

In the 13.3 grammes *per centum* (90%) haemoglobin value group of 14 infants, one died as the result of a technical accident in the exchange and another who had an exchange transfusion developed kernicterus.

In the 11.8 grammes *per centum* (80%) haemoglobin value group of nine infants, one who was not treated according to the scheme died of kernicterus.

<sup>1</sup> Sixty-three infants were treated according to the scheme and five were not. In one case the antibodies had been so weak as to be disregarded, and the infant died of kernicterus, the treatment being given too late. In four cases, staff difficulties were encountered.

<sup>1</sup> Read at a meeting of the Victorian Branch of the British Medical Association on April 6, 1955.

TABLE III.<sup>1</sup>  
Distribution of Cases.

Hæmoglobin Value.		Number of Cases.	Alive.	Died.	Exchange Transfusions.	Simple Transfusions.	No Transfusion.	Kernicterus.
Grammes per Centum.	Per Centum.							
14.8 and over	100 and over	27	26	1	7	1	19	(1)
13.3	90	14	13	1	(1)+11	—	2	1
11.8	80	9	8	1	7	1	(1)	1
9.3	70	15	15	—	15	—	—	1
8.8	60	7	7	—	7	—	—	—
7.4	50	2	2	—	2	—	—	1
5.9	40	5	3	2	(2)+3	—	—	—
4.4	30	—	—	—	—	—	—	—
2.9	20	2	—	2	(2)	—	—	—
—	?	5	3	2	(2)+3	—	—	—
Total	—	86	77	9	62	2	22	5

<sup>1</sup> The figures in parentheses refer to deaths.

In the 9.3 grammes *per centum* (70%) hæmoglobin value group of 15 infants, one who had an exchange transfusion developed kernicterus.

In the 8.8 grammes *per centum* (60%) hæmoglobin value group of seven infants, all had exchange transfusions and survived.

In the 7.4 grammes *per centum* (50%) hæmoglobin value group of two infants, one developed kernicterus. The infant also had been treated with an exchange transfusion.

It will be seen that kernicterus occurred at all cord blood hæmoglobin levels from 50% upward, and a high cord blood hæmoglobin level was no guarantee against this dreaded complication. (An infant with a peripheral blood hæmoglobin value of 128% developed kernicterus.)

In the 5.9 grammes *per centum* (40%) hæmoglobin value group of five infants, three out of five died on the first day; in the 20% group of two, both died.

It would appear that in this series a hæmoglobin value of 6.6 grammes *per centum* (45%) was the critical level, as four out of seven of these infants died on the first day.

As kernicterus takes twenty-four hours to develop, it was absent from the babies with the low cord blood hæmoglobin levels who died on the first day.

#### Kernicterus.

By the term kernicterus is meant brain damage. It may be classified as early when it shows itself in the first five days, or late when signs become obvious at some subsequent period. It takes twenty-four hours to develop, and is notoriously more common in premature than in full-term infants, and in males than in females. Some families appear to have a predisposition to it. The classical signs are head retraction, shrill cry, spasticity, fever, vomiting and convulsions, terminating with either hyperpyrexia or pulmonary oedema. In the affected infants I have examined, the central nervous system signs have always been present by the fifth day.

At times different signs may occur, notably great lethargy and hypotonia, or bizarre movements and positions of the limbs and digits. The signs may be mistaken for those of intracranial hæmorrhage, but a diagnostic lumbar puncture will settle the doubt.

Some infants with severe kernicterus will die, but those with the milder grades survive. Sequelæ may be mental defect, spasticity, various grades of cerebral palsy with athetosis or choreiform movements, major and minor epilepsy, deafness and ataxia.

In the present series there were three infants in the treated group who developed kernicterus; all of them survived. They were all delivered before forty weeks' gestation. One infant with cord blood hæmoglobin value

of 13.3 grammes *per centum* (90%) was delivered at thirty-six weeks, one with a cord blood hæmoglobin value of 9.3 grammes *per centum* (70%) was delivered at thirty-eight weeks, and one with a cord blood hæmoglobin value of 8.2 grammes *per centum* (56%) was delivered at thirty-eight weeks.

There is no doubt that exchange transfusion has tremendously minimized the incidence as well as the severity of the condition. This is borne out by contrasting the figures taken after 1952, when exchange transfusion became the accepted treatment, with figures before 1952. Table IV gives a comparison of figures from the United States of America and Melbourne.

TABLE IV.

Period.	Incidence.	Mortality.
Before 1950:		
Series of Vaughan, U.S.A. . . . .	11.6%	6.7%
Series of Bryce, Jakobowicz, Graydon and Campbell, Melbourne (1951) . . .	9.5% <sup>1</sup>	4.8%
After 1952:		
Series of Allen, U.S.A. . . . .	Nil. <sup>2</sup>	—
Present series, Melbourne . . . . .	4.8% <sup>3</sup>	—

<sup>1</sup> Series of 42 babies.<sup>2</sup> Series of 200 babies.<sup>3</sup> Series of 63 babies.

I think there is no doubt that the incidence of kernicterus can be still further reduced by the four following measures directed towards lessening the degree of jaundice: (i) The larger volume of exchange transfusion suggested by Dicke (1953)—namely, 100 cubic centimetres per pound of body weight *plus* 100 cubic centimetres—gives a replacement of approximately 90% and a more rapid disappearance of the jaundice, with a consequent lessened risk of kernicterus. (ii) The exchange transfusion is repeated if the jaundice deepens after the first exchange. In rare cases a third exchange may be necessary. (iii) An exchange transfusion is given to Rh-positive infants of Rh-negative mothers, who at birth give a positive response to the Coombs test, and who become jaundiced within eighteen to twenty-four hours. (iv) The parenteral administration of fluid, preferably by the subcutaneous drip method, but in severe cases by the intravenous route, is helpful in order to encourage the passage of large volumes of urine to aid in excretion of bile. A solution of one part Hartmann's solution and nine parts of 5% glucose solution in *Aqua Destillata* is well tolerated and easily absorbed.

In the earliest stages the symptoms of kernicterus seem to be reversible, and exchange transfusion (repeated if necessary) appears to reverse the condition.



### Deaths.

The following is an analysis of the deaths that occurred among the 63 infants treated according to the scheme. There were seven deaths (11%), all of which occurred on the first day. One was due to an accident of transfusion, in that the blood was too cold. Six were due to severe disease with gross anæmia and cardiac failure. Of these six infants, five were delivered at thirty-eight weeks' gestation and one at forty weeks' gestation.

In the four cases in which the cord blood hæmoglobin value was stated, the figures were 6.6 grammes per centum (45%) and less—namely, 5.9 grammes per centum (40%), 3.1 grammes per centum (21%) and 2.9 grammes per centum (20%). There were no deaths from kernicterus.

### The Possible Role of Toxæmia in Increasing the Severity of Fetal Erythroblastosis.

The association of congenital edema of the foetus and pregnancy toxæmia is well known. It is possible that the proven impairment of fetal oxygenation which occurs in toxæmia (Walker, 1953) may aggravate the impaired oxygenation of the anæmic erythroblastic foetus, and thus make the manifestation of fetal erythroblastosis more severe. One case in this series is at least suggestive.

A primipara, who had never had a miscarriage or blood transfusion, and who as far as could be ascertained had had no previous injections of blood or serum, had an excessive weight gain and was mildly hypertensive, the blood pressure being 130 millimetres of mercury, systolic, and 80 millimetres, diastolic. The placenta was fibrotic and calcified. The infant was severely affected, with a hæmoglobin value of 45%, and died at operation during an exchange transfusion. This mother subsequently had another infant, not included in this series. This pregnancy was normal. The infant was Rh-positive and was affected at birth; the response to the Coombs test was positive and the hæmoglobin value was 60% (8.8 grammes per centum). The baby was given an exchange transfusion, and has progressed as a normal infant.

It is also of interest that in clinics where there is meticulous ante-natal supervision for the prevention of toxæmia, the incidence of fetal erythroblastosis appears to be minimal.

### Suggestions for Treatment.

The following suggestions are made for the treatment at birth of grossly affected infants.

In none of these infants was the initial exchange transfusion carried out in two stages. As a result of subsequent experience there is no doubt that such a régime is desirable. The first stage aims at exchanging sufficient blood to enable the infant to improve, the second stage being deferred for twelve hours or so till the baby is able to tolerate the further manipulation.

Handling of and pulling on the cord cause shock to the baby, and for this reason in a severely affected baby an exchange transfusion via the saphenous vein by a really skilled operator may be preferable to the use of the umbilical vein.

### Course.

In this series the usual course was for the jaundice to clear by approximately the fifth day. Practically all babies subsequently required simple transfusions.

### Complications.

Two infants suffered from mild intracranial hæmorrhage as a result of precipitate labour following the use of pituitrin in medicinal stimulation to bring on labour. In both cases the condition cleared without sequelæ.

One infant showed the syndrome of obstructive jaundice due to inspissated bile. This lasted for the usual six weeks.

### Conclusions.

The main conclusions reached from a study of the babies treated were:

1. Exchange transfusion prevented death from kernicterus.

2. Kernicterus occurred only in babies delivered before forty weeks' gestation.

3. Kernicterus occurred with any cord blood hæmoglobin value.

4. A cord blood hæmoglobin value of 6.6 grammes per centum (45%) appeared to be the critical level in this series in relation to death on the first day.

5. Babies with a hæmoglobin value of 14.8 grammes per centum (100%) or more and no jaundice within eight hours did not require treatment.

6. Of infants giving a positive response to the Coombs test, 80% required treatment.

### References.

- BRYCE, L. M., JAKOBOWICZ, R., GRAYDON, J. J., and CAMPBELL, K. (1951), "The Incidence and Effect of Rh Incompatibility between Mother and Child", *M. J. AUSTRALIA*, 1: 781.  
 DICQUE, J. C. A. (1953), "Exchange Transfusion and Transfusions in Young Infants", *M. J. AUSTRALIA*, 1: 764.  
 WALKER, J. (1953), "Anoxia of the Newborn Infant", Blackwell, Oxford, 161.

### RH ANTIBODIES.<sup>1</sup>

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LANDSTEINER (1940) was the first to demonstrate the presence of the Rh agglutinin in human red blood cells. He found that the serum of a rabbit which had been immunized by successive injections of Rhesus monkey cells, and which thus contained Rh antibodies, agglutinated not only the Rhesus monkey cells but also the cells from 85% of white persons. The Rh factor is a permanent and static constituent of the red blood cell and is attached to the cell surface.

Normally Rh antibodies are absent from the blood serum. However, they may develop as the result of immunization of an Rh-negative person in two ways: (i) by transfusion with Rh-positive blood; (ii) by a pregnancy in which the foetus is Rh-positive and the mother Rh-negative.

In such a pregnancy, pathological lesions may occur in the placenta. Tips of chorionic villi may break off or become necrotic, so that Rh-positive red blood cells from the child may pass into the maternal circulation. Rh antibodies are formed in the mother's blood and may then pass through the placenta into the foetal circulation and cause destruction of the child's Rh-positive red cells.

At the present time three types of Rh antibody are generally recognized, as follows: (i) saline agglutinins or bivalent antibodies (Wiener), complete antibodies (Race and co-workers); (ii) blocking or univalent antibodies (Wiener), partial or incomplete antibodies (Race), agglutinoids (Hill and Haberman); (iii) cryptagglutinoids (Hill and Haberman).

### Saline Agglutinins, Bivalent Antibodies or Complete Antibodies.

The saline agglutinins were the first Rh antibodies recognized. They can be detected by the agglutination which occurs when Rh-positive cells suspended in saline are incubated with serum suspected of containing them.

The amount of antibodies present in the serum can be found by incubating the Rh-positive cells with serial dilutions of the serum. The titre is the reciprocal of the greatest dilution which causes clumping of the Rh-positive cells.

Wiener explains the agglutination by suggesting that the antibody has two places of attachment to Rh

<sup>1</sup> Read at a meeting of the Victorian Branch of the British Medical Association on April 6, 1955.



agglutinogens. In serum containing these antibodies, an agglutininogen on each of two cells may become attached to the same antibody entity and the cells are linked together. Antibody entities can thus link a number of cells together in agglutinates or clumps.

#### Blocking or Univalent, Partial or Incomplete, or Agglutinoid Antibodies.

Early workers on the Rh factor in relation to erythroblastosis were puzzled by the infrequent occurrence of Rh saline antibodies in the serum from mothers of erythroblastic babies.

The second type of Rh antibody was first described by Wiener in 1944. He thought that though no saline agglutinins could be detected in the maternal serum, the serum might affect the cells in some other way. In cases in which Rh-positive cells failed to be agglutinated when incubated with maternal serum, he re-treated the cells with a potent Rh-agglutinating serum. In many instances the cells still could not be agglutinated. He therefore inferred that the cells had been coated by a new antibody during their initial incubation with the maternal serum. Cells completely coated or "blocked" by this "blocking" serum cannot be agglutinated by subsequent incubation with a potent agglutinating serum, because there are no free agglutinogens to which the Rh bivalent antibodies can attach themselves.

The amount of blocking antibody in a given serum can be estimated by determining the greatest dilution of serum which will coat Rh-positive cells and prevent their agglutination by subsequent addition of a potent agglutinating serum. The reciprocal of this dilution is the "titre" of the blocking antibodies. This test is time-consuming (four to six hours), and it is not easy to read.

#### Conglutination or Albumin Test.

In 1945 Wiener developed the "conglutination" technique. He modified Diamond and Denton's thick suspension test. The important feature in these methods is the use of serum, plasma or human or bovine albumin as the suspension medium for the Rh-positive cells instead of saline. Serum containing "blocking" antibodies which would not agglutinate saline-suspended Rh-positive cells would agglutinate the same cells suspended in serum, plasma or albumin. Wiener suggested that a substance called "conglutinin"—a loosely-bound chemical compound containing albumin and globulin—formed a connecting link between the blocking antibody entities attached to different cells, and caused them to form clumps.

This serum or plasma conglutination test or the albumin test detects both univalent and bivalent antibodies if both are present in the one specimen of serum. The titre of the univalent and bivalent antibodies present in serum can be determined by incubating serial dilutions of the serum with Rh-positive cells suspended in albumin. Again the titre is the reciprocal of the highest dilution which causes clumping of the cells.

This titre represents the total of the univalent and bivalent antibodies present.

The titre of the univalent or blocking antibodies can be determined by subtracting the saline titre from the albumin titre.

#### The Coombs Test.

Race and his co-workers reported the existence of partial or incomplete antibodies within a few weeks of Wiener's report of the existence of blocking or univalent antibodies. The indirect Coombs test was used to detect and estimate these antibodies.

In this method, Rh-positive cells are incubated with the serum thought to contain antibodies. These become adsorbed onto the cell surface and after being thoroughly washed to remove any traces of serum containing free globulin they are mixed with Coombs reagent. If antibody has been adsorbed onto the cells, agglutination will occur.

The Coombs reagent is a rabbit anti-human globulin serum and reacts with globulin present in the antibody attached to the cells, causing them to agglutinate.

The direct Coombs test is used to detect sensitization of the cells of babies whose mothers' serum contains Rh antibodies. The child's cells have adsorbed antibodies which have been formed in the maternal blood and have then passed into the child's blood—it is an in-vivo reaction. After being thoroughly washed, these cells are agglutinated when mixed with Coombs reagent.

The albumin test and the indirect Coombs test are said to detect the same Rh antibody.

#### The Cryptagglutinoid.

Hill and Haberman have demonstrated the existence of a third type of antibody detected by both the albumin test and the indirect Coombs test; however, this antibody neither agglutinates Rh-positive cells suspended in saline nor exhibits any blocking properties.

#### Clinical Importance of Cryptagglutinoids.

Wiener has suggested that since the saline agglutinins are never present in cord blood, they must be of larger molecular size than the blocking antibodies. Whilst they are important in showing immunization of the mother, they themselves cannot cause erythroblastosis.

The clinical importance of the cryptagglutinoids has not yet been determined.

It is generally assumed that the "blocking" antibody is the most important of these three types, since it is detected in cord blood and therefore presumably causes erythroblastosis.

#### Value of Estimation of Titre of Rh Antibodies.

Although three methods have been described for detecting and estimating Rh antibodies, one only is usually used. The Wiener blocking test is no longer used, because it takes much longer than the other methods and is said to be less sensitive. The indirect Coombs test is also laborious, because of the time necessary for thorough washing of the cells.

Although it is much quicker, the albumin test is often difficult to read because of occasional gross rouleaux formation. Nevertheless it is the method of choice in many laboratories. In cases of doubt the indirect Coombs method can then be used to confirm the result of the albumin test.

In general, it is found that a high titre of antibodies is associated with erythroblastosis in the child. A titre rising as term approaches is regarded as of greater significance than a higher but constant titre. Unfortunately there are sufficient exceptions to give rise to the opinion that antibody titres are of little value.

A high titre of antibodies may be repeatedly found not only in the serum of mothers with erythroblastic babies, but also in certain other circumstances. For example, a high antibody titre may be found in some mothers of Rh-positive babies whose cells are definitely sensitized (as shown by a positive response to the direct Coombs test), yet the baby shows nothing more than slight jaundice. One of Dr. Shelton's cases is the most spectacular that I know of this type. The antibody titre rose from 64 to 4096; yet the baby, which was Rh-positive, was not given a transfusion and at the age of two months was quite well. The rising antibody titre suggests that antibodies due to a second immunization by an Rh-positive fetus were present in conjunction with the antibodies resulting from the transfusion. It is difficult to correlate the rise in antibody titre with the mild effect on the child. Similar findings have been observed in the second pregnancy. The baby was Rh-positive and its cells were sensitized. The titre of antibodies in the mother's serum was high; yet the child was so mildly affected that it was not given a transfusion. A high antibody titre may also be found in mothers of Rh-negative babies. In these instances there is a high residual titre of antibodies from immunization in a previous pregnancy. Sometimes the titre may even rise one or two tubes—for example, from 256 to 1024—later in pregnancy.

TABLE I.  
Positive Response to Albumin Test: Negative Response to Indirect Coombs Test Except at Delivery.<sup>1</sup>

Case Number.	Albumin Test Titre at Stages of Pregnancy (Weeks).				At Delivery.		Baby.
	Early.	30 to 34.	35 to 38.	39 to 40.	Albumin Test Titre.	Indirect Coombs Test Titre.	
I	—	32	—	—	8	0	Rh-positive.
II	—	—	0	—	1	0	
III	—	0	16	—	16	0	
IV	—	—	16	32	32	0	Direct Coombs response negative.
V	—	—	—	32	—	—	
VI	—	—	4	—	4	0	
VII	32	32	—	—	8	0	Rh-positive; weak direct Coombs response.
VIII	—	8	16	—	8	0	
IX	—	8	16	32	32	4	
X	—	128	128	—	8	8	Rh-positive; strongly positive direct Coombs response; no transfusion given.

<sup>1</sup> Antibodies were detected by the albumin test in 338 specimens of serum; in 25 of the same specimens no antibodies were detected by the indirect Coombs test.

On the other hand, there are some cases in which the antibody titre is relatively low and yet the baby is severely affected and may even be stillborn.

In spite of this apparent lack of correlation, a high antibody titre must be regarded as a warning signal. The majority of the babies will be sufficiently affected to need transfusion, but there will be some exceptions.

#### Method of Reporting Antibody Titres.

At the Royal Women's Hospital the standard method of reporting antibodies is as follows. The total antibody titre—the albumin titre—is first given; it is the sum of the univalent antibodies ( $x$ ) and the bivalent antibodies ( $y$ ). (Let us suppose it to be 256.) After this we give the agglutinating titre—the titre of the bivalent or saline antibodies  $y$ . (Let us take this to be 4.) The univalent, commonly—although I believe erroneously—called blocking antibodies, therefore will be obtained by subtracting  $y$  from  $(x + y)$ ; that is, in the example given, 252.

Some laboratories report the "blocking" antibodies titre ( $x$ ) when the titre has been estimated by the indirect Coombs method. The method of testing should be stated, since different tests give titres of quite different orders of magnitude, as will be shown below. This may cause confusion if some tests are performed in one laboratory and later tests in another.

#### Comparison of the Value of the Albumin Test and the Indirect Coombs Test.

The value of the albumin test and the indirect Coombs test will be discussed under two main headings—namely, (i) which is of the greater sensitivity, and (ii) which shows the greater correlation with clinical findings.

#### Sensitivity.

It is stated that the indirect Coombs test is more sensitive. During the past three years we have been collecting

TABLE II.  
Negative Response to Albumin Test: Positive Response to Indirect Coombs Test.<sup>1</sup>

Case Number.	Test.	Antibody Titre at Stages of Pregnancy (Weeks).				Antibody Titre at Delivery.	Baby.
		30	32 to 34.	35 to 37.	38 to 39.		
I	Albumin	0	—	—	128	256	Rh-positive; direct Coombs response positive.
	Indirect Coombs	1	—	—	32	16	
II	Albumin	—	—	0	0 4	4	Rh-positive; direct Coombs response positive.
	Indirect Coombs	—	—	0	2 2	4	
III	Albumin	—	0	0	0	0	Rh-positive; direct Coombs response negative.
	Indirect Coombs	—	0	1	1	2	
IV	Albumin	—	0	—	0	0	Rh-positive; direct Coombs response negative.
	Indirect Coombs	—	1	—	2	2	
V	Albumin	—	0	0	0	0	Rh-positive; direct Coombs response negative.
	Indirect Coombs	—	4	4	2	2	
VI	Albumin	—	0	—	0	0	Rh-positive; direct Coombs response positive.
	Indirect Coombs	—	0	—	4	(32) 4	
VII	Albumin	0	0	0	—	64	Rh-positive; direct Coombs response positive.
	Indirect Coombs	(4) 2	(4) 2	(8) 4	—	2	
VIII	Albumin	—	—	0	32	32	Rh-negative; direct Coombs response negative.
	Indirect Coombs	—	—	(4) 2	2	1	
IX	Albumin	0	0 62	—	—	0	Rh-negative; direct Coombs response negative.
	Indirect Coombs	(32) 16	32 32	—	—	(16) 8	

<sup>1</sup> In a series of 652 patients the serum of 584 gave a negative response to the albumin test; of these 584 specimens of serum nine gave a positive response to the indirect Coombs test.

data on this subject, and the results will be discussed from two points of view—(a) which gives the higher titre, and (b) which is capable of detecting antibodies earlier than the other.

**Higher Titre.**—Although it is held that the indirect Coombs test is more sensitive because it gives a higher titre value, this has not been our experience. In a series of 200 tests we found identical titres by both methods in 30%, a higher titre in the indirect Coombs test in 50%, but a higher albumin titre in 65%. This observation has been confirmed in a very large series of subsequent tests.

**Earlier Detection of Antibodies.**—In the majority of sera antibodies can be detected by either method at the same period of the pregnancy. However, in a few patients one method or the other will sometimes detect antibodies at an earlier stage of the pregnancy.

In 25 out of 338 sera in which antibodies were detected by the albumin method, none could be found by the Coombs test (see Table I). In eight out of the 10 patients involved, antibodies were repeatedly detected by the albumin method, but never by the indirect Coombs method. The babies were all Rh-positive, but one was sensitized.

In the remaining two patients antibodies were detected several times by the albumin method; but the indirect Coombs test result was negative until the test was performed on serum taken at delivery. These mothers all had sensitized Rh-positive babies, but none needed transfusion.

On the other hand (see Table II), in another series of 652 Rh-negative patients, antibodies were detected in 68 by the albumin method. The indirect Coombs test was then performed on the other 584 sera which appeared to contain no antibodies, and in nine of them the indirect Coombs response was positive on more than one occasion. However, these results were of importance in only two of the nine cases. In these two patients antibodies were detected earlier in the pregnancy by the indirect Coombs method, but later both tests gave positive results. The two babies were Rh-positive and had strongly sensitized cells, but neither had to be given a transfusion.

In three cases the albumin test always gave a negative result and the indirect Coombs test always a positive result, although of low titre. The babies, although Rh-positive, were not sensitized.

The other four comprised an interesting though puzzling group. Although no antibodies were detected by the albumin method, the response to the indirect Coombs test was positive. Retest by the albumin method with the use of pooled cells gave a positive reaction. Three of the babies were Rh-positive and sensitized, but none was affected sufficiently to need transfusion. The discrepancy was probably due to the presence of antibodies corresponding to Rh variants. They were detected by the pooled cells, because some cells with that particular agglutinin were present.

These results lead to the conclusion that antibodies will fail to be detected by each of these methods in a few cases. Since both tests usually detect the antibodies in most cases, one naturally chooses the quicker for routine work—that is, the albumin test. If the indirect Coombs test is then applied to those sera failing to react to the albumin test, antibodies will always be detected if they are present.

#### *Investigation as to Which Method Gives the Closer Correlation with the Clinical Findings.*

Some workers hold that the indirect Coombs titre gives the best indication of the outcome of the pregnancy. We have examined this aspect also. Both tests have been performed on sera at different stages in pregnancy in Rh-negative mothers after antibodies had been detected. Statistical analysis of the result gives the following findings: (i) that the means of the titres obtained by both methods are significantly higher for babies in the hydrops and stillbirth group than for the living babies,

who were divided into very severely affected, severely affected, mildly affected and not affected groups; (ii) that the means of the titres obtained by both methods at thirty weeks are significantly higher for babies in the hydrops, stillbirth and very severely affected but surviving groups, than those for the babies in the less severely affected, mildly affected and not affected groups; (iii) that both tests give the same information although the titre values are at different levels; that is, the same information is gained by using either of these tests and no added information is gained by using both of them.

These results show that the performance of the albumin test, with a check on all negative results by the indirect Coombs method, gives a satisfactory means of detecting Rh antibodies in the serum of all immunized mothers.

#### *Correlation of Antibody Titre and Clinical Condition.*

The failure of the titre values to give a close correlation with the clinical findings in a proportion of cases makes it difficult to predict what is going to happen to the child until he is born and his blood is examined.

There are at least two possible explanations for this discrepancy. First, attempted predictions are made on insufficient information regarding the antibodies. We are of the opinion that single estimations are of little value except as a warning sign. When sufficient estimates at the right periods in the pregnancy are available, we have found some interesting indications that there may be a close correlation between increase in antibody titre and the effect on the baby. As yet we have an inadequate number of cases with sufficient data for us to make a definite statement. Second, the lack of correlation may be due to the fact that the three commonly accepted types of Rh antibodies—saline agglutinins, blocking antibodies (taken as synonymous with univalent antibodies) and the cryptagglutinoids—represent only some of the types of antibody now known to exist.

Williams and I have evidence that there are at least five types of Rh antibody. In addition to the saline agglutinins we have shown that the univalent antibodies include the following three types: type I—blocking antibodies for saline agglutinins first described by Wiener; type II—a non-blocking antibody which may be identical with Hill and Haberman's cryptagglutinin; type III—a blocking antibody for type II univalent antibody. We have also found an antibody which reacts with the Coombs reagent but is not detected by the albumin test. This antibody is probably identical with one found by Witebsky and Mohn in their fractional protein precipitation experiments. This antibody had no blocking properties and reacted only in the Coombs test.

Although it is held that the albumin test detects Wiener's blocking antibody (type I), and this is certainly true, it is also true that this test detects the non-blocking type II antibody and its blocking antibody type III in addition to type I. We have also found that, whilst Wiener's blocking antibody is found infrequently in significant amounts, the non-blocking antibody is frequently found in high titre.

In addition these results explain why, in spite of high albumin titres said to indicate the presence of large amounts of blocking antibody, the baby's cells usually give the correct Rh-positive reaction. One would expect them to be coated with blocking antibodies and appear to be Rh-negative. This does occur, but rarely.

#### *Conclusion.*

It is evident, then, that the Rh-antibody story is far from complete. New techniques for detecting and estimating these various forms may finally lead us to decide which form causes destruction of the child's cells. With a properly selected series of titres of this offending antibody, it may then be possible to predict not only when erythroblastosis will occur, but also the degree of severity to be expected.



# AN INVESTIGATION OF THE SEROLOGICAL RESPONSE TO SALMONELLA AND SHIGELLA INFECTION OF CHILDREN.

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In this hospital a definitive diagnosis of the cause of enteritis, considered on clinical grounds to be infective in origin by isolation of a recognized pathogen from the faeces, is possible only in a minority of cases. The percentage of isolations in such cases fluctuates, and in this series was 43. The purpose of the present investigation was to ascertain whether detection of agglutinins for endemic and epidemic strains of Shigella and Salmonella would permit a definitive diagnosis of the infecting agent in some of these subjects, from whose stools no recognized pathogen had been isolated during their illness.

It was hoped that the results might serve not only to improve the percentage of diagnoses of the aetiological agents, but also to provide some assessment of the efficiency of the cultural techniques employed in this laboratory.

## PREPARATION OF MATERIAL AND METHOD OF INVESTIGATION.

Blood samples were collected within twenty-four hours of admission to hospital, and at time of discharge, from children and infants admitted to the hospital with a diagnosis of gastro-enteritis between November 6, 1952, and April 4, 1953. Serum was preserved by the addition of "Merthiolate" to a concentration of one in 1000 and refrigeration at 4° C. Bacterial suspensions for agglutination were prepared immediately from all strains of Salmonella or Shigella isolated from these patients. "H" suspensions were prepared by formalization to 0.25% of actively motile, overnight, nutrient broth cultures. "O" suspensions were prepared from overnight agar slope culture. Organisms were suspended in physiological saline and heated for two hours in a boiling water bath irrespective of motility of the strains. All suspensions were standardized to 1,000,000,000 organisms per millilitre,

<sup>1</sup> Working under a grant from the National Health and Medical Research Council.

formalized to 0.25%, tested for sterility and stored in the refrigerator.

Suspensions of the following organisms were selected as antigenically representative of the Salmonella and Shigella isolated most frequently in the period of investigation and in the preceding three years: *S. typhi-murium* "O"; *S. bovis morbi-ficans* "O"; *S. typhi* "O"; *S. anatum* "O"; *S. seftenberg* "O"; *S. adelaide* "O"; *Sh. sonnei*; *Sh. flexneri* 2a; *S. typhi-murium*, phase 1 (i); *S. bovis-morbi-ficans*, phase 1 (r); *S. typhi* (d); *S. chester* (eh enx); *S. derby* (f.g); *S. seftenberg* (g s t); *S. cholerae suis* var. Kunzendorf (1.5). These suspensions (stock suspensions) were prepared by the methods of Edwards and Bruner (1942) from nutrient broth cultures.

The range of stock suspensions was extended by the addition of suspensions containing the somatic antigens of *Escherichia coli* 0111 and *E. coli* 055. These were prepared by Kauffman's method for L forms.

The specimens of serum were first screen tested at a dilution of one in five against the full range of stock suspensions and against the organism, if any, isolated from the patient concerned. If agglutination occurred at one in five, the serum titre was determined by the serial tube doubling method starting at one in 10.

Results of "O" agglutination tests were read macroscopically in indirect light against a black background, after sixteen to eighteen hours in a water bath at 52° C. Tests for "H" agglutinins were removed from the 52° C. water bath after two hours' incubation, and a hand lens was used in direct light to make an immediate reading. The results were reread macroscopically after the tests had stood on the bench overnight, but no significant difference in readings was ever observed.

## BACTERIOLOGICAL FINDINGS.

"Admission" and "discharge" samples of serum were obtained from 96 patients clinically diagnosed as suffering from infective enteritis. Strains of Salmonella or Shigella were isolated from the stools of 42 of these 96 patients. Details of the isolations are set out as follows:

<i>S. typhi-murium</i> .....	23	} 43.8%
<i>S. adelaide</i> .....	2	
<i>S. derby</i> .....	2	
<i>Sh. flexneri</i> 2a .....	13	
<i>Sh. sonnei</i> .....	17	
<i>S. typhi-murium</i> and <i>Sh. flexneri</i> 2a ....	1	

TABLE I.  
Specific Response in *S. Typhi-murium* Infection.  
(Titres expressed as reciprocals.)

Case Number.	Subject's Age. (Months.)	First Blood Sample Titres.			Days After Onset.	Second Blood Sample Titres.			Days After First Blood Sample Taken
		"O."	"H."			"O."	"H."		
			(i)	(1.5)			(i)	(1.5)	
1	2	—	—	—	4	—	160	—	21
5	3	—	—	—	7	—	40	—	8
6	9	—	—	—	2+	—	1280	20	31
11	13	—	—	—	7	10	40	40	19
28 <sup>1</sup>	7	—	—	—	1	5	—	—	13
							40	—	17
30	10	—	—	—	4	40	1280	—	12
32	7	—	—	—	10	—	—	—	8
33	4	—	—	—	3	40	1280	—	15
46	2	—	—	10	14	—	80	5, 20	10
48	8	—	—	—	2	80	640	—	22
50	7	—	10	10	5	—	640	640	15
						10	320	320	17
							320	20	23
61	5	—	—	—	1+	160	80	2560	8
63	19	—	—	—	0	—	—	—	8
65	4	—	—	—	1+	—	—	—	13
68	12	—	—	—	1+	—	—	—	8
73	19	—	—	—	2+	160	40	1280	9
75	6	—	—	—	1+	40	2560	40	9
77	12	—	—	—	0+	80	2560	10+	8
83	8	—	—	—	1+	—	—	20	8
85	8	—	—	—	1+	10	5120	640	10
93	7	—	10	—	5	20	640	10	13
96	8	—	—	—	.3	20	40	640	13

<sup>1</sup> *Sh. flexneri* infection also.



### Serological Findings in Bacteriologically Proven Cases of *S. Typhi-murium* Enteritis.

There were 24 cases of proved *S. typhi-murium* enteritis; in 20 the serological pattern revealed by the stock antigens was characteristic of infection by an organism with the antigenic components of *S. typhi-murium* (Table I).

Agglutinins to antigens of other types of *Salmonella* were demonstrated in some cases, and with greater frequency in the older infants. The titre of *S. typhi-murium* "H" and "O" agglutinins was much higher than that of the other *Salmonella* agglutinins. Only two patients in the group developed agglutinins to *Sh. flexneri* 2a. One of these had a bacteriologically proven dual infection. The other (Case 30) developed a titre of one in five to *Sh. flexneri* 2a when blood was taken on the second occasion.

It seems reasonable to conclude, from results in this group of patients, that an "O" titre of one in 10 or more and/or an "H" titre of one in 40 or more to the antigens of *S. typhi-murium* at the time of discharge from hospital, and after negative findings in blood taken early in the illness, is diagnostic of infection with that organism.

### Serological Findings in Bacteriologically Proven Cases of *Sh. Flexneri* Enteritis.

In each of the 14 cases of bacteriologically proven *Sh. flexneri* enteritis, agglutinins to stock *Sh. flexneri* 2a suspensions were demonstrated (Table II), and in nine of the 14 cases in the group a titre of one in 20 or greater was demonstrated in the first specimen of blood taken.

#### Maximum Titres to *Sh. Flexneri* 2a Stock Suspension Observed in Patients with *Sh. Flexneri* 2a Enteritis.

The maximum titres to *Sh. flexneri* 2a stock suspension found in 14 patients with *Sh. flexneri* 2a enteritis, and the number of cases in which they occurred, are set out in the following tabulation:

1 in 5	0
1 in 10	1
1 in 20	3
1 in 40	3
1 in 80	5
1 in 160	1
1 in 320	1

If it is assumed that a two-tube rise in titre is significant, only six patients showed a significant rise in titre to stock suspension in the second specimen of blood taken.

A titre of one in 20 or greater in the first or second specimens of blood, or in both, was found in 13 of the 14 cases in which *Sh. flexneri* 2a was isolated, and in none of those cases (excluding the case of known double infection) in which *S. typhi-murium* was isolated. Therefore it seems

TABLE II.  
Specific Response in *Sh. Flexneri* 2A Infection.  
(Titres expressed as reciprocals.)

Case Number.	Subject's Age.	First Blood Sample Titres.	Days After Onset.	Second Blood Sample Titres.	Days After First Blood Sample Taken.
8	8 months.	20	50	20	19
14	13 years.	40	5	40	18
15	2 years 2 months.	40	2	40	9
19	1 year 7 months.	—	8	80	12
		—	—	40	10
		—	—	20	10
20	5 years 8 months.	—	2	160	8
25	8 months.	20	3	40	11
26	3 years 9 months.	—	1	320	8
28 <sup>1</sup>	7 months.	—	14	20	13
35	5 months.	—	—	5, 20	17
39	1 year 8 months.	20	4	10	8
		—	5	80	7
70	4 years.	20	62	—	19
80	1 year 4 months.	—	1+	80	19
84	11 years.	80	11	40	9
87	1 year 3 months.	40	6	80	5

<sup>1</sup> Also proven *S. typhi-murium* infection.

that a minimum titre of one in 20 to *Sh. flexneri* 2a suspension in either specimen of blood is strongly suggestive of recent *Sh. flexneri* 2a infection.

### Serological Findings in Cases in which Pathogens other than *S. Typhi* and *Sh. Flexneri* 2a were Isolated.

The results of serological investigations of the patients with *S. adelaide* (2) and *S. derby* (2) and *Sh. sonnei* (1) infections were consistent with the results in the two main infective groups respectively.

TABLE III.  
Group III Agglutinins Consistent with Specific Infection in "No Pathogens Isolated" Group.  
(Titres expressed as reciprocals.)  
(a) *Salmonella Typhi-murium*.

Case Number.	Subject's Age. (Months.)	First Blood Sample Titres.			Days After Onset.	Second Blood Sample Titres.			Days After First Blood Sample Taken.
		"O."	"H."			"O."	"H."		
			(1)	(1.5)			(1)	(1.5)	
13	1 year 4 months.	—	—	5	0	—	40	—	11
27	1 year 2 months.	20	80	—	—	40	1280	—	8
45	5 months.	—	40	160	3+	10	80	160	4
						10	40	40	17
						5	80	40	7
47	2 years 1 month.	5	—	—	4	160	80	1280	9
49	2 years.	—	—	—	3½	20	—	160	5
86	12 months.	20	40	—	0+	40	2560	—	7
91	1 year 2 months.	—	5	—	3+	40	640	—	6

#### (b) *Shigella Flexneri*.

Case Number.	Subject's Age.	First Blood Sample Titres.	Days After Onset.	Second Blood Sample Titres.	Days After First Blood Sample Taken.
42	2 years 2 months.	—	1+	80	15
55	5 months.	20	13+	40	11
66	4 months.	10	9	20	12
81	3 years 3 months.	Less than 10	1+	20	7

### Agglutinins to *E. Coli* 0111.

Agglutinins to *E. coli* 0111, an *a coli* strain, were detected in eight patients from whom a *Salmonella* or *Shigella* had been isolated, and in 14 patients from whom no pathogens were isolated—that is, in 22 of 96 patients. The ages of these patients ranged from thirteen weeks to thirteen years on their admission to hospital. In general the titres were low—one in 20 or more, frequently less.

Titres in the two blood specimens of one in 10 and one in 80, one in 320 and one in 160, and one in 640 and one in 1280, were recorded in three cases, which were both bacteriologically and serologically *Sh. flexneri*, *S. typhi-murium* and *S. adelaide* infections respectively.

In the group in which no pathogens were isolated, titres to *E. coli* 0111 of one in 80 and one in 80 (Case 16), one in five and one in 80 (Case 90) and one in 320 and one in 20 (Case 42) were demonstrated; but Case 42 was classified as *Sh. flexneri* 2a on serological evidence (titre 0 and 80).

### *E. Coli* 055.

Investigations for agglutinins to *E. coli* 055, a *p coli* strain, were limited to 23 pairs of sera. Agglutinins were detected in only four patients. The highest titre observed was one in 20 in the second specimen (first specimen one in five) of a boy, aged thirteen years, with a proven *Sh. flexneri* infection.

### Serological Findings in the Group in which No Pathogens Were Isolated.

Paired sera were available from 54 children, bacteriological investigation of whom had given negative results for strains of *Salmonella* and *Shigella*. In two cases culture of stool or rectal swab had not been attempted, in six cases one specimen had been cultivated, in 10 cases two specimens had been cultivated from each child, and in the remaining 36 cases three or more specimens had been cultivated from each child.

Antibody was demonstrated in 30 children in this group; all were aged four months or more at the time of their admission to hospital. The serological findings (Table III) fitted clearly into the requirements previously defined for *S. typhi-murium* in seven cases, and for *Sh. flexneri* in four cases. No additional cases could be attributed to other strains of *Salmonella* or to *Sh. sonnei*.

If the serological findings in Cases 16 and 90 are accepted as proof of infection with a *coli*, then 17 cases remain in which antibody, but no clear antibody pattern, was demonstrated. As in the previous groups these miscellaneous antibodies were most frequently to *S. anatum* "O" and *S. seftenberg* "O" (11 to both, four to *S. seftenberg* only and one to *S. anatum* only).

### Serological and Bacteriological Findings in 96 Cases.

The relative efficiency of bacteriological and serological methods of investigation for *Salmonella* and *Shigella* in this group of 96 patients is illustrated in Table IV.

TABLE IV.  
Comparison of Bacteriological and Serological Methods of Investigation for *Salmonella* and *Shigella* Infections.

Causative Organism.	Total Number of Cases Investigated.	Diagnosed by Culture Alone.	Diagnosed by Serological Examination Alone.	Diagnosed by Either Culture or Serological Examination.
<i>S. typhi-murium</i> ..	96	24 (25.0%)	27 (28.1%)	31 (32.3%)
<i>Sh. flexneri</i> ..	96	14 (15.5%)	17 (17.5%)	18 (18.5%)
All strains of <i>Salmonella</i> or <i>Shigella</i>	96	42 (43.5%)	48 (50.0%)	53 (55.5%)

All patients for whom the diagnosis of *Salmonella* or *Shigella* infection rested on serological findings alone were

aged four months or more at the time of their admission to hospital. In this age group, serological investigation increased the diagnosis of *Salmonella* or *Shigella* infection from 36 out of 75 to 47 out of 75.

### Age and Antibody.

*S. typhi-murium* was isolated from six of 20 infants aged less than four months at the time of their admission to hospital, and was associated with a typical antibody response in five children. The only unexplained agglutinin in the 20 paired sera from this group was *E. coli* 0111 (titre one in 10, second specimen of blood), in a bacteriologically and serologically proven case of *S. typhi-murium* enteritis.

The youngest patient for whom a diagnosis of *S. typhi-murium* enteritis was made on serological grounds alone had agglutinins to 1 (one in 640) and to 1.5 (one in 640) at the age of nine weeks after the onset of illness twenty days earlier. After a further seventeen days, antibody to *S. typhi-murium* "O" (titre one in 10) was demonstrated.

The isolation of *S. typhi-murium* was not associated with a typical antibody response in four infants, aged respectively seven weeks, four months, eight months and twelve months at the time of their admission to hospital. The onset of diarrhoea had occurred nine days prior to the taking of the final blood specimen in the two older infants, but histories of eighteen days' and fourteen days' diarrhoea preceded the taking of the final specimen in the younger pair.

Miscellaneous antibodies were demonstrated in 59 of 96 patients. These agglutinins occurred as frequently in those cases in which a recognized pathogen was isolated and in which the recognized serological response to that pathogen was well defined, as in the group in which no evidence of infection with *Salmonella* or *Shigella* was available. The agglutinins of this type most frequently encountered were agglutinins to *S. seftenberg* "O" and to *S. anatum* "O".

TABLE V.  
Agglutinins to *S. Anatum* "O" and to *S. Seftenberg* "O" in 96 Cases.

Organism.	Age (Months).			
	Four.	Four and Over.	Eight and Over.	Sixteen and Over.
<i>S. anatum</i> "O" ..	0/20	4/18	10/31	16/27
<i>S. seftenberg</i> "O" ..	0/20	6/18	15/31	20/27

### DISCUSSION.

The specificity of serological reaction was clearly indicated in the classical reaction to the appropriate stock antigen in 24 of the 28 cases in which *Salmonella* was isolated from the faeces. The experience with *Shigella* agglutinins indicated that the rise in agglutinins was much more rapid after the onset of illness (nine out of 15 subjects had a titre of one in 20 or greater in the first blood sample) than in the case of *Salmonella* infection. In two of these cases an abnormally long history of diarrhoea preceded investigation, but in the remainder no such explanation of the initial titre was available. It appears that in young children in this city a low titre of *Shigella* agglutinin can be accepted as diagnostic of recent infection.

The difference in age between the group of patients infected with *Sh. flexneri* (average age two years and five months) and with *S. typhi-murium* (average age seven months) is consistent with findings in the hospital over a longer period and with the findings of other workers.

An increasing frequency of antibody to a variety of *Salmonella* antigens with advancing age occurs in all children, whether or not pathogens are isolated. Agglutinins to all antigens used in the survey were encountered

tered at low titre in at least one patient. Agglutinins of this type to *S. anatum* "O" and to *S. seftenberg* "O" were encountered most frequently. The origin of these agglutinins is doubtful, as *S. anatum*, or strains of *Salmonella* with which it shares antigens, are not frequently encountered in this hospital. *S. seftenberg* is considered to be one of the less virulent *Salmonellas*. It has been isolated from 10 patients in this hospital in the last three years, and in each case its role as a pathogen was doubtful. Recent work undertaken at the Public Health Laboratory, Melbourne, indicates that it may be more widely spread in the community than our findings suggest.

The relationship between isolation of *E. coli* 0111 from the bowel and the presence of agglutinins to the same organism in the blood, has not been investigated in this hospital. Little information is available on this aspect of the pathogenicity of  $\alpha$  and  $\beta$  coli; but failure to detect antibody in cases in which the organisms have been cultivated from the stools in association with diarrhoea has been a frequent experience.

Combination of cultural and serological methods of investigation in this group of patients has raised the percentage of bacteriological diagnoses of *Salmonella* and *Shigella* infections from 43 to 55.

Recent improvements in cultural techniques—for example, the use of brilliant green agar medium for swab cultures from tetrathionate broth—increase the possibility of diagnosis by isolation of the organism. However, further improvements in cultural techniques are still possible.

If in the future the use of chemotherapeutic agents hinders isolation of *Salmonella* and *Shigella*, the utility of serological methods in the diagnosis of enteritis will be enhanced.

#### SUMMARY.

1. Ninety-six children between the ages of three days and thirteen years admitted to the Royal Children's Hospital, Melbourne, with a diagnosis of infective enteritis were investigated. Stools were repeatedly cultivated for strains of *Salmonella* and *Shigella*. Admission and discharge serum samples were examined for agglutinins to endemic strains of *Salmonella* and *Shigella*.

2. *Salmonella* or *Shigella* organisms were isolated from stools or rectal swabs from 42 children.

3. Examination of the agglutination titres indicated that an appropriate *Salmonella* "O" titre of one in 10 and/or a *Salmonella* "H" titre of one in 40 or greater at the time of the patient's discharge from hospital permits a presumptive diagnosis of infection with *S. typhi-murium*. This finding is probably applicable to other varieties of *Salmonella*.

4. In this series, a titre of one in 20 or greater to *Sh. flexneri* 2a at any time during illness permitted a presumptive diagnosis of infection with this organism.

5. When these standards were applied, the number of definitive diagnoses of enteritis in these 96 patients was increased from 43 to 55.

#### ACKNOWLEDGEMENTS.

The writer expresses her thanks to Dr. J. W. Perry for advice and help, and to those members of the laboratory staff whose cooperation aided this investigation, to the State Public Health Laboratory, the Queensland Institute of Medical Research for certain strains of organisms, and finally to the members of the medical staff of the Royal Children's Hospital for their cooperation.

#### REFERENCE.

EDWARDS, P. R., and BRUNER, D. W. (1942), "Serological Identification of *Salmonella* Cultures", Kentucky University Agricultural Experimental Station, Circular No. 54.

## Reports of Cases.

### ABDOMINAL AORTIC ANEURYSM: RESECTION OF BIFURCATION AND HOMOGRAFTING (WITH HYPOTHERMIA).

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Sydney.

ABDOMINAL aortic aneurysm is a fatal disease. With increase in size of the aneurysm, death from rupture and hæmorrhage is likely within five years from the time of diagnosis (Estes, 1950). It occurs most frequently in the segment below the renal vessels, and may encroach upon the bifurcation. There may be associated aneurysms of the major branches. Atherosclerosis is the usual cause, and in a series reported by Estes (1950) this condition was responsible in nearly every case.

In the case to be presented, four aneurysms were found—one in the abdominal aorta, one in each common iliac artery, and one in the right internal iliac artery. Pain in the back, and a pulsating swelling in the upper part of the abdomen to the left of the mid-line are the usual findings. However, there may be no symptoms, the swelling being first discovered during a routine examination.

Various methods of treatment have been tried. Resection and replacement by a homograft, or by some plastic material, appear to offer the most satisfactory result, provided that the general physical condition of the patient is otherwise reasonably good. With the advent of hypothermia the hazards of this operation have been lessened.

#### Clinical Record.

A man, aged sixty-six years, was admitted to Sydney Hospital under the care of Dr. T. E. Spark, who referred him for resection and grafting of an abdominal aneurysm. The patient complained of a pulsating abdominal swelling which had been present for nine months. For two months before his admission to hospital the swelling had been increasing in size. For seven and a half months severe pain, which was aggravated by lying down and relieved by standing, had been present in the lower part of the back. For two months before operation the patient was apprehensive because of increasing tension in the enlarging swelling, which he feared might rupture after even a slight blow.

Examination of the patient revealed a large pulsating swelling centred slightly to the left of the mid-line, and a little above the umbilicus. It was approximately 10 centimetres in diameter (Figure 1). The pulses of the lower limbs were present, but those of the *dorsalis pedis* and posterior tibial arteries were diminished in power. The nutrition of the skin of the feet was good. The blood pressure was 125 millimetres of mercury, systolic, and 75 millimetres, diastolic. The pulse rate was 80 per minute, and the pulse was regular in time and amplitude. There was no evidence of interference with the venous return from the lower limbs.

Special investigations revealed that the renal function was within normal limits and that there was no demonstrable cardiac disease. An aortogram showed that the aortic aneurysm was situated below the level of the renal vessels.

After premedication with "Omopon" and scopolamine, anaesthesia was induced with thiopentone and succinylcholine, and was maintained with nitrous oxide, oxygen, pethidine and "Tubarine". Respiration was controlled throughout. After a slow intravenous injection of chlorpromazine, the patient's temperature was lowered by the application of plastic bags filled with ice and salt to the body and limbs as far as the ankles. When the rectal temperature had reached 32.6°, the icebags were removed and the operation was commenced. The rectal temperature continued to fall for one and a half hours after removal of



the icebags until it reached 29.4° C., and it remained in the vicinity of 30° C., without further cooling, for the duration of the operation, which lasted ten and a half hours. The average room temperature was 21° C.

The abdomen was opened through a left paramedian incision, which extended from the xyphisternum to the symphysis pubis. This was combined with a left oblique incision from just above the umbilicus to the left subcostal margin in the region of the ninth intercostal space. Examination of the abdomen revealed the following aneurysms: (i) An aneurysm of the abdominal aorta, which extended from 2.5 centimetres below the renal vessels to, and including, the aortic bifurcation; it was 15 by 10 centimetres in area (Figure II). (The inferior mesenteric artery arose from the lower third of the aneurysm and was sharply kinked at its origin. There was no pulsation in the vessel.) (ii) An aneurysm of the left common iliac artery, 6.5 by 6.5 centimetres in area. (The left internal iliac artery appeared to be thrombosed.) (iii) An aneurysm of the right common iliac artery, which included the commencement of the right external iliac artery, seven by six centimetres in area. (iv) A small aneurysm at the commencement of the right internal iliac artery.

The peritoneum along the left paracolic gutter was incised, and the left half of the colon and the posterior peritoneum were reflected to the right side of the aneurysm. Bleeding occurred in the splenic pedicle, and the organ was removed. The left ureter was found to be adherent to the aneurysm and was dissected clear. At this stage much oozing of blood occurred, which was suggestive of fibrinolysis, and the blood replacement required was 21 pints.

Difficulty was encountered in freeing the aneurysms from the inferior vena cava and the common iliac veins. Eventually, after the lower three lumbar arteries on each side, the inferior mesenteric artery, the ilio-lumbar arteries and

the middle sacral artery had been tied, the aorta was clamped and divided 2.5 centimetres below the renal arteries. It was then possible to lift the main aneurysm forwards away from the inferior vena cava and find a plane of cleavage.

At the level of the bifurcation, further dissection was impossible because the common iliac aneurysms were

firmly adherent to their veins. It was therefore decided to remove the main aortic aneurysm (Figure III) and leave these two aneurysms undisturbed. They were closed above and below and the contents were aspirated. This left a rather bulky mass in the region of the promontory of the sacrum. (It was later found convenient to lead the graft to the left around these two masses.)

The homograft had been stored in the Sydney Hospital bone and artery bank under deep-freeze conditions. It consisted of the abdominal aorta from one centimetre above the celiac axis down to both external iliac arteries. The graft was anastomosed in the following order: aorta, right external iliac artery and lastly left external iliac artery. Endarterectomy of the patient's vessels was carried out for a short distance to allow a satisfactory anastomosis, interrupted everting sutures of fine silk being used.

The aorta was clamped for two hours fifteen minutes, during which time the main aneurysm was freed from the inferior vena cava, and the external iliac arteries were prepared to receive the graft. This time was also involved in oversewing the internal iliac aneurysms and performing

the anastomosis of the aorta above and the right external iliac artery below. By clamping the left common iliac artery of the graft, blood was allowed (after two hours fifteen minutes) to flow to the right leg. After a further forty-five minutes the anastomosis to the left external iliac artery was completed. Delay had occurred in performing this last anastomosis because of a tear in the left common

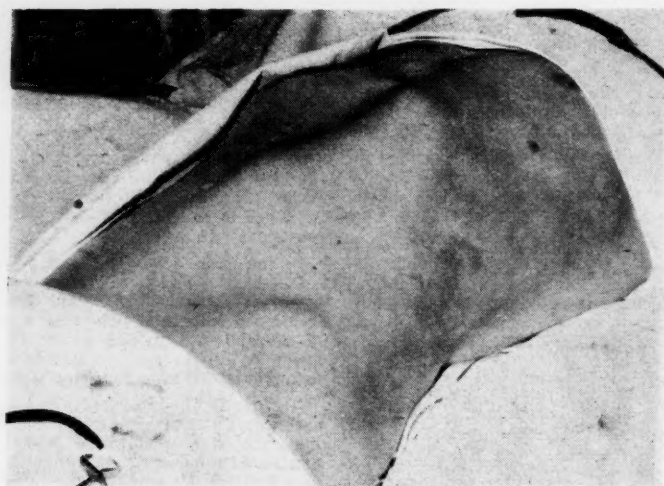


FIGURE I.  
Swelling due to aneurysm, to the left of the mid-line and a little above the umbilicus.

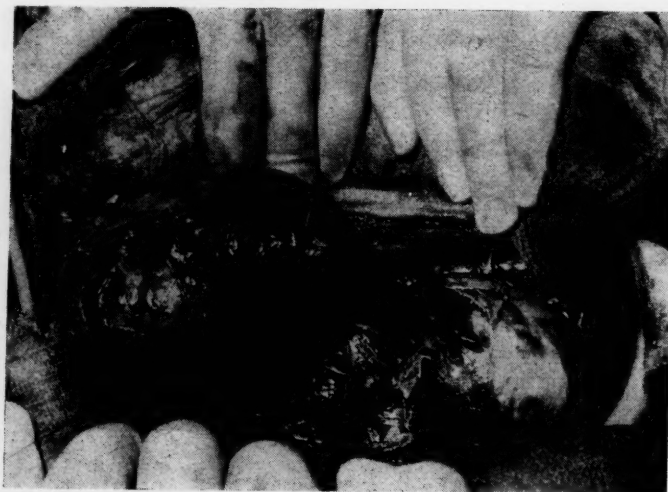


FIGURE II.  
Photograph taken from above and to the patient's right side. It shows the aneurysm of the abdominal aorta with the inferior mesenteric artery passing down between the two external iliac aneurysms.



iliac vein which proved difficult to repair. After completion of the anastomoses, the graft filled well and pulsation was present in both femoral arteries (Figure IV).

A piece of "Ivalon" surgical sponge, seven by five centimetres in area and three millimetres thick, was sutured around the aortic anastomosis to provide protection against possible rupture of this union. Bilateral lumbar sympathectomy was performed, the first lumbar ganglion on the right side being left. The colon was replaced and the wound was closed with drainage of the left paracolic gutter.

Post-operatively the patient was nursed in a cool room with the limbs exposed, and re-warming was not hastened. There was no interference with the urinary output during or after the operation. Despite the fact that there was considerable destruction of collateral vessels, bladder control was unaffected, bowel sounds were present the day after operation, flatus was passed on the second post-operative day and a normal bowel action occurred on the third post-operative day. At that time pulses were present in both femoral arteries and both popliteal arteries, but the *dorsalis pedis* and posterior tibial pulses were absent.

Ischaemia of the toes of both feet has been the only complication. At the present time (four months after the operation) the right foot has recovered. There is dry gangrene of the first, second, third and fourth toes of the left foot, but a good capillary circulation is present up to the line of demarcation.

Pulsation has returned in the posterior tibial artery of each foot, but not in the *dorsalis pedis* arteries.

#### Comment.

Arterial homografts are collected aseptically and as soon after death as possible. The donor should be young and

should be free of a transmissible disease (Rob, 1953). Therefore, it can be appreciated that there is an obvious scarcity of suitable homografts. However, as the graft

does not survive in the host, but acts only as a conduit which becomes lined with endothelium from the host, grafts made of plastic materials are likely to prove more satisfactory.

At the Prince of Wales Hospital, Randwick,<sup>1</sup> as the result of preliminary experimental work with sheep, along the lines suggested by Schumacker (1954), I have found that a segment of tubing, fashioned from plastic cloth, has acted as an effective conduit when inserted between the divided ends of the abdominal aorta. In the case reported, a piece of plastic cloth was held in readiness in the operating theatre, but as the homograft proved adequate, there was no need to use the plastic. Further, experiences with "Ivalon" sponge used in animal experiments have been similar to those of Grindlay (1951). The interstices of the sponge become filled with fibrous tissue and blood vessels. In the case reported the sponge was used to protect the aortic anastomosis against rupture.

Dry gangrene occurred in the toes of the limb whose artery was occluded for the longer period. This may have been avoided by injecting heparin into the vessel distal to the clamp, but in view of the tendency to bleeding, this drug was withheld. Prolonged interference with the blood supply to the extremities may also be avoided by first by-passing the aneu-

rysm with the graft. After the circulation has been reestablished, the isolated aneurysm may then, if necessary, be removed.

By decreasing metabolic demands, hypothermia extends the period of safe aortic occlusion. This method was used

<sup>1</sup> Annexe of Sydney Hospital.



FIGURE III.  
Main aortic aneurysm, showing commencement of common iliac branches. (Scale, centimetres.)

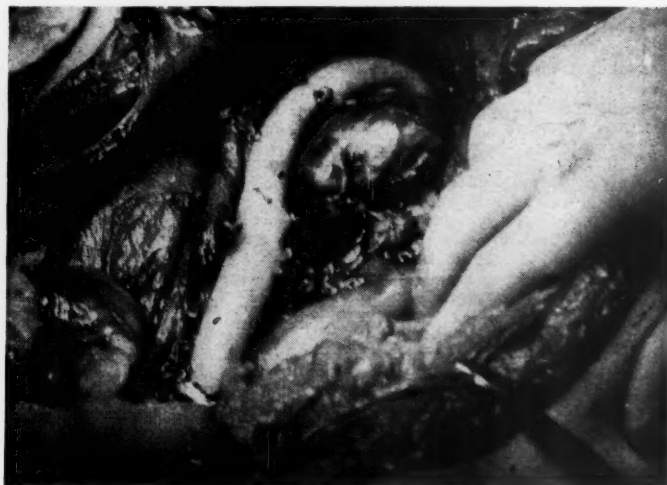


FIGURE IV.  
Photograph taken from above and to the patient's right. It shows the graft lying in place. The proximal anastomosis can be seen with the graft passing downwards to the left of the common iliac aneurysms (collapsed). The bifurcation of the graft and the anastomoses of its common iliac branches to the patient's external iliac arteries are just beyond the view of the camera.

on this patient because it was possible that the aortic clamp would be placed close to the renal vessels, and interference with the renal circulation might have occurred. Provided that hypothermia is satisfactorily controlled, the benefits to the patient during the course of a long and extensive operation are many, and not the least appears to be a reduction in post-operative exhaustion. It was revealing to hear the patient comment only twelve hours after the operation: "I have lost no energy."

#### Acknowledgements.

I wish to express my gratitude to Dr. M. P. Susman, in whose surgical unit this patient was treated, for his enthusiastic cooperation and encouragement. Acknowledgement is due to Dr. G. Davidson for his skilful administration of the anaesthetic combined with hypothermia and his management of the resuscitative measures. Acknowledgement is also due to Dr. J. Dixon Hughes and Dr. J. Blackwell (registrars, Sydney Hospital) for their technical assistance both before and during the operation, and to Mr. R. Money and Dr. G. Michel for the photographs. The ready help of the New South Wales Red Cross Blood Transfusion Service is appreciated. The plastic sponge used was supplied by the manufacturers, Ivano, Incorporated, of Chicago.

#### References.

- ESTES, J. E., JUNIOR (1950), "Abdominal Aortic Aneurysm: A Study of One Hundred and Two Cases", *Circulation*, 2: 258.  
GRINDLAY, J. H. and WAUGH, J. M. (1951), "Plastic Sponge which acts as a Framework for Living Tissue", *Archiv. Surg.*, 63: 288.  
ROB, C. G., and EASTCOTT, H. H. G. (1953), "Arterial Grafting", *Brit. Surg. Progress*, Part 1: 1.  
SCHUMACKER, H. B., JUNIOR, HARRIS, E. J., and SIDERS, H. (1954), "Pliable Plastic Tubes as Aortic Substitutes", *Surgery*, 37: 80.

### AORTIC GRAFTING FOR ABDOMINAL ANEURYSM.

By M. P. SUSMAN,  
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WITHIN the last three months two patients have been admitted to my service at Sydney Hospital with aneurysm of the abdominal aorta and both iliac arteries. One of these cases is reported in this issue by my colleague Alan Sharp, and the second case is presented here.

#### Clinical Record.

A carpenter, aged fifty-three years, complained of diffuse abdominal pain of six months' duration and the loss of 20 pounds in weight during this period. The pain sometimes spread to the left side of his chest and was occasionally accompanied by vomiting. He had noted moderate dyspnoea on exertion, but he had had no anginal pain or intermittent claudication. On examination of the patient, there was evidence of recent weight loss and of hypertension (his blood pressure was 240 millimetres of mercury, systolic, and 140 millimetres, diastolic). There was a rounded pulsating mass in the line of the abdominal aorta from about the level of the renal vessels to the brim of the pelvis; along the brim of the pelvis there was an extension of the tumour on each side. A confident diagnosis could be made of aneurysm of the lower part of the aorta and of the iliac arteries, and this was supported by radiological evidence of calcification in the mass. The Wassermann and Kline tests produced negative results. The report on an electrocardiogram was that there was no specific pattern, but that it was slightly abnormal. Aortograms were unsatisfactory, showing only patchy distribution of the dye. The blood sedimentation rate was consistently high. Intravenous pyelographic findings were normal, and the results of renal function tests were good. X-ray examination of the oesophagus, stomach and duodenum revealed no intrinsic abnormality, but there was a defect in the distal third of the stomach consistent with a mass outside the stomach and not attached to it. The possibility of multiple myelomatosis or carcinoma was suggested by the results of electrophoretography. Anaemia

recurred several times after adequate blood transfusions had restored the haemoglobin value to normal. Cold agglutinins were found in the blood; for this reason it was decided not to lower the patient's temperature artificially, as had been originally planned. No evidence of neoplasm could be found anywhere on clinical and ancillary examinations.

After consultations it was decided to replace or circumvent the aneurysm with an aortic-iliac graft.

The operation carried out on this patient differed from that performed on our other patient in the following ways: (i) The aneurysm was approached directly from the front instead of from the side; that is, the left side of the colon was not reflected towards the mid-line. (ii) The aneurysms were not disturbed and only one lumbar vessel was tied.



FIGURE I.

The iliac ends of the graft have already been sutured. The aortic end is being approximated to the patient's aorta, which is held in a clamp.

(iii) The iliac components of the graft were inserted before the aortic part of the anastomosis was made. (iv) Heparin (2500 units) was injected down each femoral artery at the time of the anastomosis. (v) The patient's temperature was not artificially lowered. (vi) Hypotension was induced twice during the operation. (vii) No sympathectomy was performed.

After premedication with "Omnopon" and scopolamine, induction of anaesthesia and intubation were performed with thiopentone and succinylcholine. Pethidine, "Tubarine" and nitrous oxide were used to maintain anaesthesia, and controlled respiration was used throughout. Blood was replaced as indicated through a cannula in each arm. A solution of "Arponad" was used to lower the blood pressure during several stages of the operation when the bleeding was expected to be troublesome. Atropine and "Prostigmine" given intravenously were very effective in reversing any residual curarization at the conclusion of the operation.

The abdomen was opened through an incision from the xiphisternum to the pubes and through a lateral extension from the centre of this mid-line incision to the left flank. All the abdominal viscera appeared to be normal; they were particularly examined for neoplasm in view of the clinical and auxiliary findings. There was no difficulty in completely exposing a large aneurysm involving the aorta from just below the renal vessels to the bifurcation, and extending from this to both iliac arteries. The aorta was exposed and cleared immediately above the aneurysm and just below the renal arteries; it was slightly larger than normal here and very atheromatous. As it was being cleared behind there was some embarrassing venous bleeding, which was easily controlled temporarily but could not be permanently stopped until the injured vein was

immediately closed with strong silk. Within a few minutes the aneurysm was again full and it pulsated, but much less vigorously than before. Injections of 2500 units of heparin were given into each femoral artery just as the anastomosis was started. Sympathectomy was not performed. The omentum was brought down to cover the aneurysm and the graft, and the abdomen was closed in layers.

The patient made a good immediate recovery from the operation, but convalescence was spoiled by acute dilatation of the stomach and by hepato-cellular jaundice, which were treated on general lines. He gradually recovered from both of these complications and then rapidly improved. He has good peripheral pulses and there is no nutritional disturbance of his feet or legs. He no longer complains of abdominal pain, and his general condition is better than it was before operation. The aneurysm is smaller and less pulsatile. The post-operative electrophoretogram differed from the pre-operative one and was consistent with hepatitis, of which there was ample clinical evidence.

#### Acknowledgements.

Dr. Alan Sharp obtained the graft and gave invaluable help with the operation. Dr. George Davidson was responsible for the anaesthesia and resuscitation; his comments are incorporated in this paper. The resident doctors and the nursing staff coped valiantly with the convalescence, complicated as it was by acute dilatation of the stomach and jaundice. Dr. H. S. Wardlaw and Dr. G. A. Johnston, of the Institute of Pathology, conducted many tests and examinations.

#### Reviews.

**The Casualty Department.** By T. G. Lowden, M.A., B.M., B.Ch., F.R.C.S.; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 10" x 7", pp. 286, with 170 illustrations, 12 in colour. Price: 37s. 6d.

This is an excellent book. The first eleven chapters deal with the management of the problems commonly presenting in casualty departments and general practice. Among attractive recommendations is the "cleavage dressing".

The remaining five chapters are headed "Organization", "The Financial and Temperamental Background", "Disposal", "Legal Responsibilities", and "Legal Protection". Much in these chapters is concerned with the present condition of medical practice in England under the *Health Service Act* and the *Legal Aid and Advice Act*. But these chapters would be of value and interest to any medical practitioner, for they have to do with human nature, the fears and aspirations of patients, the duties and pitfalls for practitioners, as well as with English practice under the new dispensation. Some section headings are "Certificates", "Injury Benefits" (our workmen's compensation), "General Practice", "The Police Case", "Self-incriminating Evidence", "Inebriation", and "Suicide".

The only weakness noted is the method of operating for paronychia. Figures 50 and 52 illustrate the method, and its unsuitability. It involves a relatively large incision, under anaesthesia, to evacuate through healthy tissue a small bead of pus, which can often be reached painlessly and bloodlessly, by inserting the blunt end of a needle into the nail fold, and lifting up the eponychium.

This book will be of great value to many, and of interest to all practitioners, general or special.

**Diagnosis and Treatment of the Acute Phase of Poliomyelitis and its Complications**, edited by Albert G. Bower, M.D.; 1954. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" x 6½", pp. 268, with 64 illustrations. Price: 70s.

This is a book which should be read by all medical officers who work in institutions dealing with the acute stage of poliomyelitis.

At least 75% of the book is concerned with the management of the bulbar and respiratory types of the disease. In this particular field the workers at the Los Angeles County Hospital, the second largest communicable disease hospital in the United States, are acknowledged as world authorities. From an experience of 17,000 cases, the authors have produced a most comprehensive volume dealing with the diagnosis, nursing care, blood chemistry, dietetic management, physical therapy, orthopaedic care, obstetrical complications



FIGURE II.

The suturing of the graft to the host has been completed and all the clamps have been removed. The graft lies across the aneurysm. The left iliac part of the graft is obscured by the corresponding part of the aneurysm.

exposed later. The external iliac vessels were dissected free just above the inguinal ligament and traced upwards as far as possible; in this way more than two inches of the artery on each side became available for the anastomosis; both these arteries were surprisingly elastic and soft. There were extreme fibrosis and inflammation around the aneurysm, and at one area no plane could be found between it and the inferior vena cava. Similar changes were present around the iliac parts of the aneurysm. It was decided not to attempt its removal. The graft was joined to both external iliac arteries and to the aorta with a series of interrupted and continuous sutures of 4 x 0 silk on atraumatic needles after the removal of some atheromatous plaques from the host vessels. The graft rested snugly on the surface of the aneurysm (Figures I and II). After the aorta and iliac vessels had been clamped, the aneurysm was emptied of clot and debris. Some fresh bleeding followed this manoeuvre, and the opening was



and the transportation of the patient. In addition the various mechanical devices used in therapy are described and illustrated.

Considerable space is devoted to the physiology of breathing and to a description of what actually occurs in the respiratory failure of acute poliomyelitis. It is pointed out that exhalation of carbon dioxide is equally as important as the inhalation of oxygen and that the terms anoxia, anoxemia *et cetera* are not physiologically descriptive of what actually occurs. In poliomyelitis with respiratory failure inadequate oxygen intake is accompanied by inadequate carbon dioxide output; and even if the amount of oxygen inhaled is augmented artificially, it accomplishes very little for the patient unless concurrently the amount of carbon dioxide exhaled likewise is sufficiently increased.

There is no doubt that these principles of respiration are not sufficiently understood and appreciated by many, and it would seem that in the application of these principles the tank respirator or iron lung has advantages over other systems of artificial respiration. The tank respirator is more versatile and lends itself to modifications which can increase the efficiency of the expiratory impulse and thus improve the gaseous exchange. It is in this respect that the tank respirator appears to have a distinct advantage over the Danish method of positive pressure administration of air or oxygen through a cuffed tracheotomy tube. Incidentally, the mortality figures given by Bower and those obtained in this country by the use of the tank respirator in the acute stage are considerably better than those obtained by other methods.

An excellent description of the use of tracheotomy in the bulbar type of the disease is given, and the operation and the after-care of the patient are described in detail. The indications for the use of the respirator are carefully considered and the pitfalls of mere visual appraisal of a patient's respiratory status are explained.

Another chapter is devoted to special nursing procedures. Tracheotomy care, placing a patient in the respirator, feeding the respirator patient, intravenous set-up in the respirator, bladder irrigation and decubitus care are all excellently described. For this chapter alone the book is worth placing in all hospital libraries for reference.

The final chapter is devoted to the experiences of the Washoe County medical team, in which the advantages of a team of individual specialists are convincingly demonstrated. It makes most interesting reading.

This book has so much valuable information to impart that it seems a pity to have to criticize parts of it for obscure and often loose writing. Some passages give the effect of rather hasty editing and have to be read several times before the correct meaning is obtained. This does not make for easy reading; but to those interested in the subject this book will repay careful study.

**Advances in Enzymology and Related Subjects of Biochemistry.** Edited by F. F. Nord; 1954. New York: Interscience Publishers, Incorporated. London: Interscience Publishers, Limited. Volume XV. 9½" x 6½", pp. 558, with 56 text figures. Price: \$11.00.

THIS, the fifteenth volume of "Advances in Enzymology and Related Subjects of Biochemistry", should be in the hands of everyone interested in the subject. The titles of the several sections showing the range of subjects covered and the names of their authors are evidence of the cosmopolitan outlook of those responsible for the series. The volume has been edited by F. F. Nord, of Fordham University, New York.

S. J. Leach, of Melbourne, deals with the mechanism of enzymic oxidation. René Wurmser, of Paris, writes on *Thermodynamique des réactions immunologiques*. T. P. Singer and Edna B. Kearney, of Madison, Wisconsin, deal with the chemistry, metabolism and scope of action of the pyridine nucleotide coenzymes. Ephraim Racker, of New Haven, discusses alternate pathways of glucose and fructose metabolism. Severo Ochoa, of New York, writes on enzymic mechanisms in the citric acid cycle. H. Lindley, of Melbourne, deals with the mechanism of action of hydrolytic enzymes. Maurice Stacey, of Birmingham, deals with the enzymic synthesis of polysaccharides. S. Ratner, of New York, discusses urea synthesis and metabolism of arginine and citrulline. Akiji Fujita, of Kyoto, Japan, has thiaminase as his subject. N. J. Berridge, of Sharnfield, England, discusses rennin and the clotting of milk. Von Gerhard Schramm, of Tübingen, Germany, has as the title of his contribution "*Die Struktur des Tabakmosaikvirus und seiner Mutanten*". In addition to an author and subject index of this volume, there is a cumulative index (subject and author) for the fifteen volumes of the "Advances in Enzymology" already published.

## Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Surgery of the Small and Large Intestine", by Charles W. Mayo, M.D.; 1955. Chicago: The Year Book Publishers, Incorporated. 8½" x 6", pp. 340, with 94 illustrations. Price: \$9.00.

Divided into four sections: "Introductory", "The Small Intestine", "The Colon", and "The Rectum and Anus: Benign Lesions".

"Reactions with Drug Therapy", by Harry L. Alexander, M.D.; 1955. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. 9½" x 6½", pp. 314, with 33 illustrations. Price: £3 11s. 3d.

The author deals in turn with mechanisms, dermatological manifestations, systemic patterns and drugs of various groups.

"An Outline of the Treatment of Fractures", by the Committee on Trauma of the American College of Surgeons; Fifth Edition; 1954. Chicago: American College of Surgeons. 8½" x 5½", pp. 110, with 45 text figures. Price: \$1.00.

The first edition was published in 1931.

"The Surgical Clinics of North America"; 1955. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. Chicago Number. 9" x 6", pp. 326, with 90 illustrations. Price: £6 per annum in paper binding and £7 5s. per annum in cloth binding.

Consists of a symposium on technique and procedures in surgery. There are 29 chapters with a foreword and there are 47 contributors.

"A Textbook of Neurology", by H. Houston Merritt, M.D.; 1955. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 9½" x 6", pp. 746, with 181 illustrations. Price: £6 14s. 6d.

This book "is written as a text on neurology for medical students and physicians".

"The Year Book of the Eye, Ear, Nose and Throat" (1954-1955 Year Book Series); The Eye, edited by Derrick Vail, B.A., M.D., D.Oph. (Oxon.), F.A.C.S., F.R.C.S. (Hon.); The Ear, Nose and Throat, edited by John R. Lindsay, M.D.; 1955. Chicago: The Year Book Publishers, Incorporated. 8" x 5½", pp. 462, with 118 illustrations. Price: \$6.00.

One of the Practical Medicine Series of Year Books.

"The Visual Fields: A Study of the Applications of Quantitative Perimetry to the Anatomy and Pathology of the Visual Pathways", by Brodie Hughes, M.B., B.S. (London), Ch.M. (Birm.), F.R.C.S. (England); 1954. Oxford: Blackwell Scientific Publications. 10" x 7½", pp. 184, with 158 illustrations. Price: 35s.

This book "is intended as a text-book in the old medical tradition, a statement of one man's views and experiences of a particular subject".

"Pulmonary Diseases", edited by Roscoe L. Pullen, A.B., M.D., F.A.C.P.; 1955. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 9½" x 6½", pp. 670, with 199 illustrations, one in colour. Price: £8 1s. 3d.

There are 18 chapters, dealing with a wide range of pulmonary conditions, and 20 contributors.

"History of the Second World War: United Kingdom Medical Series", Editor-in-Chief, Sir Arthur S. MacNalty, K.C.B., M.A., M.D., F.R.C.P., F.R.C.S. "The Army Medical Services: Administration", edited by F. A. E. Crew, F.R.S.; Volume II; 1955. London: Her Majesty's Stationery Office. 9½" x 6", pp. 588, with 45 illustrations. Price: 65s.

Deals with special aspects of administration, including nursing, hygiene, dental, pathology, transfusion, psychiatric, ophthalmic and radiological services, as well as medical provision for the Auxiliary Territorial Service and the Directorate of Medical Research.



## The Medical Journal of Australia

SATURDAY, JULY 23, 1955.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

### THE TRAINING OF A SURGEON.

SURGEONS are not like Topsy—they do not just grow. The holding of a higher degree or diploma in surgery or of an appointment to the surgical staff of a hospital does not necessarily make a man a surgeon. Even if he acquires all the accoutrements, the ornaments, of a successful surgeon, if he writes apparently learned articles and has them published in medical journals, and if he is bowed down to by many admirers, he is not therefore a surgeon. The point about the work of a surgeon is that his results generally depend on some act undertaken by him after what should be careful deliberation, or on his refusal to act, in the belief that no action is needed. It is thus apparent that the result of surgical treatment wrongly conceived may be much more disadvantageous to the patient than treatment carried out, say, by a physician. The result of surgical treatment may, of course, be much more permanent than the result of medical treatment because the surgeon may have thought it necessary to remove an organ or part of an organ or other structure. There is plenty of reason, therefore, to assert that the training of a surgeon presents one of the most difficult problems in medical education. The late Harvey Cushing is quoted by Vernon C. David as having outlined what he considered to be the necessary requirement of a man selected to become head of a department of surgery in a medical school.<sup>1</sup> Cushing listed all the essential attributes of character, a happy family life, outstanding ability as a

teacher, investigator and surgeon, an imaginative and stimulating mind, a pleasing personality, an interest in public affairs *et cetera*. Cushing is reported then to have said that no such man existed.

Post-graduate education in surgery was one of the subjects discussed by V. M. Coppleson in 1951 in his report on the development of graduate and post-graduate medical education at home and abroad. Coppleson referred to the American resident system of graduate training and also to the registrar system of the United Kingdom. In regard to the American system, he explained in a footnote that to understand the degree of responsibility given to residents, the staffing of one of three surgical services at a large American teaching hospital might be taken as an example. He went on as follows:

This service comprises fifty-eight public ward beds and is staffed by a resident, one assistant resident, four other assistant residents and eight interns. The scheme is run on a system of "pyramiding" in which the numbers of residents in the higher grades are reduced each year; it is in contrast to the "parallel" systems, in which no yearly reductions in numbers take place. The first year internship is a "straight" service, confined to surgical subjects. The eight first year interns of the service rotate through general surgery, urology, orthopaedics and surgical pathology. After this they either leave or become assistant residents, of whom there are five in each surgical service; the assistant residents, however, are not recruited entirely from the hospital interns.

Assistant residencies cover a five-year period. In their first year the assistant residents are virtually senior interns. They are assigned to a ward and supervise the work of the junior interns. Next year they rotate through urology and surgical pathology and are first assistants at operations. In the following year they are assigned to six months' duty in the private section and six months in emergency surgery. Next year one on each service becomes a first assistant resident. His duty is the responsibility for the entire fifty-eight beds under the "resident" and he does some of the more difficult operations. The "resident" himself is responsible for all patients on his service. He performs or is responsible for most of the operations, less than one-third of which are done by the attending staff, and he supervises and assists other residents.

In the United Kingdom, Coppleson wrote, after a compulsory term of one year or more in a house appointment or internship, the further years of training could be divided into a first period of one or two years of junior clinical appointments as "registrar", preferably at a teaching hospital, and a second period of three years or more as a "senior registrar" devoted to training in a selected specialty. He explained that in the first period the training was more or less preceptorial and that the second corresponded more to the American resident system with its emphasis on training and research.

There is in Australia no generally approved and accepted programme for the training of surgeons. A useful purpose will therefore be served if we draw attention to an editorial which deals with teaching in graduate surgical training.<sup>2</sup> The editorial is signed by Samuel P. Harbison. Harbison states that since the end of the second World War, there has been in America a hurried expansion of available residency programmes. Large numbers of young men wish to undergo graduate surgical training, and certification by the American boards (these are well described in Dr. Coppleson's report) is sought, not only for general recognition, but because hospital governing boards are using certification as the only practical yardstick by which to evaluate competence. Out of the situation

<sup>1</sup>"The Surgical Clinics of North America", February, 1955.

<sup>2</sup>Surg., Gynec. & Obst., April, 1954.

which has developed certain deficiencies in training programmes have arisen, and these have prompted Harbison to discuss exactly what the term "teaching" means. He finds that the deficiencies in the training programmes fall into three groups. The first of these deficiencies concerns the hospitals. Some of them have not had a plan before, and very often the interests of the residents are exploited for the benefit of the busy, practising, attending staff. What we read here is important wherever the training of surgeons is undertaken. The hospitals in question, we are told, have not fully realized that the acceptance of a training programme demands a sacrifice of far more time than is saved by the presence of the residents. There is not sufficient graded responsibility, since the members of the attending staff do not have time to oversee the slower work of the residents. "From the resident's angle it would be far better that his chief makes rounds on 8 patients per day with time for discussion than upon 35 who are seen simply for routine orders in the course of a busy practice." The second deficiency is that didacticism sometimes becomes synonymous with "teaching" in the graduate sense. Residents ask for lectures, cinematograph films and formal presentations leading to a passive adsorption of facts. The use of this word adsorption is most happy in this connexion. Its full force becomes clear when we read that residents should have stimulation of active thinking processes which will lead to the absorption of knowledge. That these planned sessions are often more on the undergraduate than on the graduate level is the result of an incorrect interpretation of the meaning of "teaching". The graduate student should be able to read literature intelligently and to obtain his information from contemporary authorities. In scientific conferences he should be a colleague and not a student. Nothing could be better put than this. The result of this deficiency gives rise to the third, which is that the resident has little chance to develop maturity of judgement and thought since he is given no definite responsibility. Harbison thinks that the resident should be in full charge of writing orders, for private as well as ward patients, throughout his training, and that during his final year he should have complete responsibility, both administratively and professionally, under supervision, of the available ward service, which implies most of the actual operating. There will not be general agreement with the contention that the surgeon, during his training, should undertake "most of the operating"; it must, however, be granted that he should be allowed to undertake operative procedures under supervision and that if possible the procedures allotted to him should be graded. It thus becomes clear that the success of any scheme for the training of surgeons will depend upon the willingness of the senior, the teacher, to accept as collaborators those who are about to enter the field of surgery. Seniors among the members of the practising profession will recall how in their "resident" days seniors were more than jealous of their preserves, as they obviously regarded them, only rarely allowing a senior resident medical officer to wield the scalpel, and then only on minor occasions. Harbison thinks that the deficiencies which he has mentioned appear to be the fault of the teachers and the hospitals. He points out, however, that this is not altogether true since the resident himself has fostered some of them. He looks

for didactic teaching in order that he may collect facts which will help him to pass an examination; further, the trainee sometimes considers jobs in which the eventual reward may be a staff appointment instead of jobs in which the training is better. Harbison deplores a materialistic attitude which threatens to change the art of medicine into the business of medicine. We are all surely by now very much alive to this possibility.

Harbison suggests several measures which may help to cope with the deficiency. In the first place, ample experience and graded responsibility in the various fields should be provided. Secondly, the trainee must be encouraged to read and learn intelligently from his cases as he sees them and not to depend upon formal lectures for his "teaching"; thirdly, less stress must be placed on examination requirements and more on adequate training; fourthly, the resident should be exposed to the methods of medical investigation and to actual participation in research if possible; fifthly, an attempt should be made to broaden his general background. This is not a purely academic discussion, although it might appear to be so. The statement has already been made that there is not in Australia a generally approved and accepted system of surgical training. There is, however, in existence, in the requirements of the Royal Australasian College of Surgeons for its fellowship, a programme which, if it is faithfully carried out, should produce the type of surgeon that will satisfy such an advocate as Harbison. The apprenticeship system adopted by the College is obviously right. Of course, the College system, like any other system, will be achieved only if those who teach and those who are in training act from the right motives and are true to the tradition of the branch of the profession which they follow.

## Current Comment.

### FOCAL PULMONARY HÆMOSIDEROSIS AND RHEUMATIC HEART DISEASE.

THE deposition of iron in the form of hæmosiderin in various body tissues, especially the liver, is well known. This condition of hæmosiderosis may be without clinical ill-effects and, as R. Motteram and W. E. King<sup>1</sup> pointed out in 1950, must be distinguished from the disease entity hæmochromatosis, in which fibrosis of the pancreas and cirrhosis of the liver occur, together with much hæmosiderin in these two organs and lesser amounts in the remaining body storage tissues. Motteram and King brought forward evidence to contradict the view that the primary cause of the hepatic and pancreatic fibrosis found in hæmochromatosis is the accumulation of the hæmosiderin within the parenchymal walls bringing about their destruction and consequent fibrosis of the organ. Indeed, they reached the general conclusion that the weight of available evidence encouraged the belief that gross hæmosiderin accumulation produced no injurious effect on its containing cell.

The clinical unimportance of hæmosiderosis (from the point of view of doing harm) has been brought out in a different field by Michael J. Esposito,<sup>2</sup> who discusses the question of focal pulmonary hæmosiderosis associated with rheumatic heart disease. He states that pulmonary hæmo-

<sup>1</sup> In "Studies in Pathology: Presented to Peter MacCallum", Melbourne, 1950.

<sup>2</sup> *Am. J. Roentgenol.*, March, 1955.

siderosis, the intraalveolar deposition of hæmosiderin, occurs in two distinct clinical states: first, idiopathic pulmonary hæmosiderosis; second, chronic failure of the left side of the heart. Idiopathic pulmonary hæmosiderosis is a frequently fatal disease of unknown aetiology met with almost exclusively in children and characterized by recurrent episodes of fever, dyspnoea, cyanosis, hæmoptysis and anaemia. It was discussed, especially from the radiographic viewpoint, in these columns on April 17, 1954. Esposito is particularly concerned, again from the radiographic viewpoint, with focal hæmosiderosis associated with left-sided heart failure. This failure, he states, may result from any cause, but is almost invariably from rheumatic heart disease with mitral stenosis. Focal hæmosiderosis is not as rare a complication of rheumatic heart disease as is generally believed. Esposito found that the total incidence in 100 cases was 28% and the radiographic incidence 5%. Small foci of hæmosiderin were observed with aortic stenosis alone, but the vast majority, including all large enough to be recorded on the skiagram, were the result of mitral stenosis. Patients with mitral stenosis are stated to have a relatively good life expectancy, and this, coupled with their proclivity for both pulmonary hæmorrhages and repeated episodes of congestive failure, makes them particularly prone to develop hæmosiderosis. In Esposito's study it was impossible to determine at the clinical level whether or not any given patient with chronic rheumatic heart disease had focal hæmosiderosis. A large percentage of the patients gave a history of hæmoptysis, but there was no correlation between the degree of hæmoptysis and hæmosiderosis. Indeed, patients who never had any bloody sputum exhibited advanced hæmosiderosis, whereas others with frequent bouts of hæmoptysis showed only small numbers of pigmented macrophages in their lungs. The lack of correlation does not serve to minimize the importance of hæmorrhages in the production of the hæmosiderin deposits, but rather indicates that hæmoptysis is at best a poor index of the amount of intraalveolar hæmorrhage. There proved to be no correlation between the duration of heart disease and the presence or the extent of focal hæmosiderosis.

Esposito goes on to state that the basic pathological change in focal hæmosiderosis is the presence of innumerable hæmosiderin-containing histiocytes that are jammed into juxtaposed alveoli. There is often a considerable amount of associated fibrosis, with the formation of a sharply demarcated nodule. The surrounding alveoli may be perfectly normal, but usually manifest some changes of chronic passive congestion. The arterioles invariably show degenerative changes that reflect the presence of increased pressure in the pulmonary circulation. The essential radiological feature of focal hæmosiderosis is a diffuse, fine, granular pulmonary nodulation. This is nearly always associated with an enlarged heart bearing a mitral configuration. The nodules are irregular in outline and on the skiagram generally measure between two and four millimetres in greatest diameter. On occasion they may be as large as five millimetres. They are concentrated in the mid-zones, but do extend towards the periphery in all directions. The apices are usually spared, but in the more advanced cases this may not be so. Actually the nodules are uniformly situated throughout the lungs in most cases, and the distribution evident radiographically is due to differences in lung volume. The nodules of hæmosiderosis are constant and, once present, have never been observed to disappear or to decrease in size. Pulmonary congestion tends to obscure the miliary nodules and is of itself able to produce a pseudonodularity in the lung fields. Fortunately, the changes are often transient. In addition, the nodularity is primarily in the parahilar areas, and fades out as the vessels course peripherally. In contradistinction to this, the aggregates of hæmosiderin are often clearly visible in the outermost lung fields. It is the presence of these nodules beyond the confines of any conspicuous vascularity that is diagnostic. Esposito has little doubt that many cases of focal hæmosiderosis are dismissed as examples of severe pulmonary congestion, and it is the failure to differentiate the two that is chiefly

responsible for the relative rarity of its reported occurrence.

In conclusion, Esposito comments that the course of rheumatic heart disease is in no way altered by the presence of nodular hæmosiderosis. The nodules are not responsible for symptoms, nor do they adversely affect pulmonary function. They do not influence the prognosis, although in most cases the prognosis is grave because the mitral stenosis is marked. Hæmosiderosis is not a contraindication to mitral valvotomy, and its presence should in no way influence the decision on whether or not a patient is suitable for operation.

#### RADIATION HAZARDS.

In view of the intense world-wide interest which has been taken in the effect of test explosions of atomic bombs, and the apprehensions which these have aroused, it is most satisfying to have actual figures on which to base our thinking. Already in these columns, on May 28, 1955, some calculations of the effects of atomic explosions on the weather have been quoted, and it was shown that any interference was relatively small and unimportant. Now a report by Sir John Cockcroft<sup>1</sup> on radiological hazards from nuclear explosions and nuclear power further emphasizes the fact that man is as yet still far from equalling the powers of Nature, and that the casual effects of his best destructive efforts to date represent only a molehill beside the existing mountains.

There are two effects to be considered: the immediate destructive action of local radiation from an atomic explosion, and the long-term effect of minor degrees of radiation on chromosomes and genes, with its influence on mutation. Regarding atomic explosions, the tests have been confined to isolated regions where the local effect did no harm.

The genetic influence of radiation is brought about in several ways. First, there is natural radiation, the sum of the earth's radiation, the natural radiation of the body, and the continual bombardment of the earth by cosmic rays. Next there are the effects of certain everyday procedures whose importance is just being recognized—incidental irradiation from such sources as X-ray tubes and television screens. Thirdly there are the by-products of atomic explosions, and finally the radiations from atomic industry plants. Unless atomic war supervenes, it can be predicted that the third will decline very greatly, and soon; the fourth will increase steadily, but not to any great degree. To assess the genetic influence of radiation, it is taken that in man the average age of reproduction is thirty years, and that the effect of radiation is proportional to the total dose received by any individual during his first thirty years. Natural radiation, the constant and unavoidable influence in the background of our evolution, is measured at 3r per thirty years over most of the earth, although in high places such as Tibet it reaches 5r per thirty years without doing any obvious damage. For general purposes the figure of 3r per thirty years is taken as the norm—the yardstick against which all artificial forms of radiation are measured. This amount of radiation produces changes, usually deleterious, in the structure of the chromosomes, and mutations in the genes of the reproductive cells which alter, usually for the worse, many hereditary characteristics. Fortunately the worst of the changes are incompatible with survival; the types of change are determined by chance, and identical changes do not occur simultaneously or in large numbers; most mutations are recessive, so that they become apparent only in homozygous individuals, the offspring of two persons each carrying the affected gene, and the odds against the coincidental mating of two such individuals are very great. On the other hand, mutation for the better must also occur at times, and one big improvement might offset many small depreciations. Unmeasurable as the natural mutation rate is, it can be defined as the rate determined by the perpetual influence of 3r of radiation per thirty

<sup>1</sup> *Nature*, May 21, 1955.



years, and some geneticists have laid it down that to double, by doubling general radiation, the natural mutation rate, would be disastrous, over many generations, to civilization. That is as may be—it is a scientific estimate, arrived at in spite of many unknown variables—but considering that the people of Tibet have been exposed to 5r for many generations without gross deterioration, it may be unduly conservative. However, it will serve as a basis for discussion.

Turning now to something measurable, let us consider radiation in the atomic industry. Here the massive local effects are confined and shielded. The average radiation dose received by workers at Harwell is 0.25r per annum; that is, those who work there from the age of twenty years until they are thirty will receive an extra 2.5r in their theoretical reproductively sensitive period, making a total of 5.5r. That is close to the doubling dose, and if they had ever had a fractured femur they might easily have reached or even passed it.

Disposal of radioactive wastes extracted from spent uranium fuel presents some problems, but they are known and finite problems, and so far they have been handled satisfactorily, without risk to the general population. The by-products of atomic explosions, however, are uncontrollable, and it is these which have recently caused so much concern. Cockcroft points out that there is no difference between the hydrogen bomb and the original atom bomb except in magnitude. The quality of the radioactivity is the same. (Incidentally, he disposes of the popular rumour that introduction of cobalt into a hydrogen bomb would poison the whole earth—he states that a cobalt bomb would offer no advantages even to a lunatic designer.) When a hydrogen bomb is exploded on the ground, millions of tons of radioactive particles are produced. The heaviest particles fall out quickly, over a localized area; the lighter are carried up into the stratosphere, where they spread out and circulate, slowly falling out over a period of years. When a bomb is exploded in the air, the radioactive particles almost all go into the stratosphere. In Great Britain, monitoring of the contamination of the atmosphere by various means has enabled certain calculations to be made. At ground level, during the past three years, radioactivity due to bomb explosions of all types has averaged about 1% of the average natural radioactive dust content, which depends mainly on the natural emission of radon from the ground. Britain has received, so far, 0.01r of radiation from the falling-out of radioactive debris derived from atomic explosions, and a further amount of 0.02r is expected to fall out during the next few years. In Nevada, close to the site of a number of explosions, the dose so far has been 0.05r to 0.2r. In Britain, where people are protected from falling particles for much of the time by brick houses, and where much radioactive material is washed from the air by rain and taken directly down drains and into crevices in the ground, it is calculated that only one-tenth of the actual falling radiation will reach the population—that is, all the atomic explosions so far have increased natural radiation by one one-thousandth.

Cockcroft considers other side effects. The amount of nitrous oxide produced by a hydrogen bomb explosion is about equal to the amount produced each day by thunderstorms. Dust from Krakatoa caused a temporary diminution of 10% in the intensity of sunlight at the earth's surface; a hydrogen bomb explosion on the ground would do no more, and probably much less. Much radioactive carbon-14 is produced by a hydrogen explosion, but most is diffused into the stratosphere, whence it falls out slowly. It would equal about one one-thousandth of the amount naturally present in the atmosphere due to the action of cosmic rays, which in turn contributes about 0.03r to the human body per thirty years.

By comparison, any person who has had a series of X-ray pictures taken, especially in or near the pelvic region, or who has sat regularly for several hours per week in front of a television screen, or who has stood on a viewer for even a few seconds every time he has tried on a new pair of shoes, has undoubtedly received radiation in an infinitely greater dosage than the relatively small and

negligible amount received through the deliberate use of atomic energy so far. Actually, if the everyday emanations from the three sources of radiation just mentioned are not correctly curbed, their cumulative effect over several generations might easily be greater and more serious, genetically, than the theoretical effect of a full-scale atomic war. If, say, one thousand hydrogen bombs were exploded in a global war, there would still be numerous survivors completely untouched by the primary effects of the explosions. Cockcroft calculates that secondary radiations would affect that generation to the extent of 25r—but that generation only, for there would not be enough survivors or organizations left to create hydrogen bombs for use in the next several generations. The long-term genetic effects of even such a large dose, when it was exercised on a single generation, would not be so important as a much smaller dose exercised on many generations.

We can afford, therefore, to discount the mote of past and present atomic radiations—but we should set about removing the beam of careless non-atomic radiation. In any case, it is obviously as difficult to interfere seriously with natural genetic processes as it is to alter all other natural processes, and the real present danger from atomic development is not that we may adversely influence the heredity of posterity, but that we may leave no posterity to be influenced.

#### HEBERDEN'S NODES.

HEBERDEN's original description of "*digitum nodi*" dismissed them as being hardly ever attended with pain, and unsightly rather than inconvenient. Robert M. Stecher,<sup>1</sup> in his Heberden Oration for 1954, deals very thoroughly with this most appropriate subject. He first divides the lesions into two categories. Many men have the deformity in one finger, and can trace it to some injury; this Stecher calls traumatic Heberden's node. Many women, however, have a history of involvement of one finger during the late forties, without association with trauma, and with later extension to many or all of the other fingers; these are designated idiopathic Heberden's nodes.

Stecher defines idiopathic Heberden's nodes as enlargements of the terminal interphalangeal joints which can be seen and felt as nodules or bony ridges across the palmar and dorsal surfaces, progressing to produce a flexion deformity and later a lateral deviation of the joint. Lateral X-ray views show spurs first from the proximal dorsal aspect of the distal phalanx, then from its palmar aspect, and from the dorsal and palmar aspects of the distal end of the middle phalanx. The joint surfaces are often unequal and roughened, and show increased density. The condition often extends to the proximal joints. It does not appear in the absence of a normal and intact nerve supply to the fingers; in a patient with a median nerve injury all fingers but those normally supplied by the injured nerve showed Heberden's nodes. The patient is usually in good health, and there is no constant association with hypertension, obesity or arthritis in other joints.

The frequent development of idiopathic Heberden's nodes in women of middle age, and their almost complete absence in men, led Stecher to investigate the hypothesis that they are determined by heredity. He found that there was a high familial occurrence, and when the pedigrees of 72 women and two men with the condition were examined, it became apparent that it is dominant in women and recessive in men, so that heterozygous women and homozygous men develop it. When the statistical expectations and probabilities were checked against known data, there was agreement, sufficiently close to make the hypothesis of hereditary determination probable.

Stecher concludes that nothing can be done to prevent the development of the condition or to bring about its disappearance; if there is pain as the nodes develop, aspirin will relieve it. He considers that it is satisfying

<sup>1</sup> Ann. Rheumat. Dis., March, 1955.

to the physician and reassuring to the patient to be able to assure her that she is suffering from an hereditary disease which comes on at about the same time as the menopause, though not caused by it, that although there is no treatment it will not progress to anything more than a moderate degree of deformity, and that it does not indicate the onset of some severe crippling disease. With this we must agree; so many patients nowadays are frightened at the prospect of that dread disease, "arthritis", that to be able to relieve them entirely of their anxieties at the first appearance of Heberden's nodes must indeed be satisfying.

#### A JOURNAL FOR PAPUA AND NEW GUINEA.

THE first number of *Papua and New Guinea Medical Journal* has appeared. This is an important event, and one of which we are glad to take notice. Its objects are set out in a foreword by Dr. J. T. Gunther, Director of the Department of Public Health of the Territory. He states that the journal has been established as an instrument of the Department, and is to be published quarterly. He adds that since the arrival of the first medical officers in the Territory, medical personnel have carried out research into the particular medical problems of the Territory. The results of the study have been published outside the Territory and advances in the prevention and treatment of the diseases existing in the Territory have been spread by external medical journals and departmental circulars. For some time the Department has wished to publish a journal devoted to the disease pattern and other problems peculiar to the Territory. The object of the journal is to keep all grades of medical personnel abreast of world progress in the prevention and treatment of the disease pattern of the Territory, to promote medical research locally in those diseases, and to facilitate an exchange of ideas between officers who are otherwise geographically isolated. The first number contains three original articles, one clinical report, two reviews of patrol reports, with an editorial, some extracts from current literature and two book reviews.

We hope shortly to publish a special report on the medical services in the Territory of Papua and New Guinea, and from this it will be seen that the service is a live service, that opportunity for work within the Territory exists and that these opportunities are many and varied. The name of the editor of the new journal is not disclosed, but he is obviously an officer of the Department of Public Health in Port Moresby. The journal has been printed and published by the Government Printer of Port Moresby. It is certainly a credit to him and to the editor.

#### PETHIDINE AND HEART DISEASE.

PETHIDINE has great value in its analgesic, sedative, and spasmolytic effects, and its depressant action on the myocardium and the blood pressure is negligible. But W. P. Harvey, F. Berkman and J. Leonard,<sup>1</sup> in an article entitled "Caution Against the Use of the Meperidine Hydrochloride (Isonipocaine, Demerol) in Patients with Heart Disease, particularly Auricular Flutter", emphasize the pharmacological similarity between this drug and atropine and quinidine, especially in its ability to antagonize acetylcholine, and to inhibit the vagal action of digitalis. The authors first noticed trouble with pethidine in a patient with aortic insufficiency and auricular fibrillation. The fibrillation was easily controlled by digitalis and quinidine, and a plastic valve prosthesis was successfully inserted, but on the fourth day after operation tachycardia and auricular flutter developed. These did not respond to digitalis and quinidine, and the patient's condition

deteriorated seriously. It was then realized that there was a close correlation between the tachycardia and the injections of pethidine which had been given in increasing doses as a sedative from the time of operation. The drug was stopped, and the tachycardia ceased; within five days normal sinus rhythm was restored, and further progress was uneventful. Thereafter, in a series of four other patients with auricular flutter, this effect of pethidine in producing tachycardia was observed. In two other patients no such effect was produced.

Normal persons who develop persistent severe tachycardia may suffer cardiac dilatation and congestive failure; in patients with heart disease, even moderate tachycardia can have similar, and more serious, results. The authors' warning that pethidine should be used with caution in certain cases of heart disease, particularly in patients with auricular flutter, is therefore worthy of serious consideration, in view of the experiences they have described.

#### UNSUSPECTED GONORRHOEA.

In an endeavour to evolve a rapid screening procedure for detecting gonorrhoea, S. R. Taggart allowed samples of urine from known sufferers to stand for one hour, then decanted them, and examined the sediment after Gram staining.<sup>1</sup> In 75% of the specimens, Gram-negative intracellular cocci were found in the sediment. This may not appear to be a very useful result, but it is to the other side of the picture that we wish to draw attention. Taggart, in cross-checking this method, examined urine specimens from 120 male and 177 female new out-patients in the general medical and surgical departments of a large hospital. None of these patients was known to have gonorrhoea, or was suspected of having it, or was seeking treatment for it—yet 15% of the males and 6.8% of the females had Gram-negative intracellular diplococci in their urinary sediment. In each, subsequent examination confirmed the diagnosis. That the test, as a test, is not very efficient is neither here nor there. That, even in the high-prevalence population surveyed, such a high percentage of gonorrhoea should exist (and if the test is only 75% efficient, the true figures might easily have been 20% and 9%), unsuspected by the hospital and not giving the patients enough inconvenience to cause them to seek treatment, will partly explain why it is taking so long, in spite of modern treatment, to eliminate gonorrhoea. Even if the test is not very efficient, it may still find a useful place in an anti-gonorrhoea campaign.

#### ADVICE TO MEDICAL PRACTITIONERS.

UNDER the title "Advice to Medical Practitioners", the New South Wales Medical Board has prepared a booklet primarily for young practitioners who are being registered. It contains details of the requirements and machinery for registration in New South Wales and certain related matters, such as reciprocity of registration. In addition, the disciplinary powers of the New South Wales Medical Board are set out, and information is offered on the expression "infamous conduct in a professional respect". Brief but helpful notes are included on such matters as "covering", the giving of improper certificates, advertising, the use of degrees, descriptions *et cetera*, canvassing, sharing of fees and fees charged by medical practitioners. This booklet should be studied with care by all who practise or intend to practise medicine in New South Wales. We understand that the intention of the Medical Board is to distribute a copy to all registered medical practitioners in New South Wales when adequate supplies are available.

<sup>1</sup> *Am. Heart J.*, May, 1955.

<sup>1</sup> *Pub. Health Rep.*, March, 1955.

## Abstracts from Medical Literature.

### PHYSICAL THERAPY.

#### Ultrasoft X Rays in the Treatment of Superficial Cancer.

E. ANDRUP AND I. OVERGARD (*Brit. J. Radiol.*, April, 1955) state that ultrasoft X rays are produced at low voltages (10 to 30 kilovolts) and have only a low power of penetration. From a practical therapeutic point of view the half value layer is best expressed in terms of millimetres of skin and in general is less than, or just equal to, two millimetres of skin. These rays have small penetrating power, and in the treatment of superficial carcinoma an adequate dose can be given to the malignant cells in a single dose without damage to the underlying normal tissue. This is of great value in treatment of skin cancer near the eye or on the ear. Only tumours equal to or less than two millimetres in thickness are suitable for this method. In choosing the optimum half value layer, the maximum tumour thickness should be assessed, and the optimum half value layer should equal about two-thirds of the maximum tumour thickness. The authors use a Philips contact therapy unit with a mica-beryllium tube, and an average dose given is 6000r. The cosmetic results are good. No case of radionecrosis occurred; and when recurrence was noted, it appeared to arise because an insufficient margin was allowed around the visible tumour.

#### Carcinoma of the Paranasal Sinuses and the Nasal Cavities.

L. LARSSON AND G. MARTENSSON (*Acta radiol.*, August, 1954) present a report on the symptomatology, therapeutic technique and results of treatment of 379 subjects of carcinoma of the paranasal sinuses and nasal cavities met with during the period from 1940 to 1950 in Stockholm. Of the total number 45 patients were not treated, as their condition was considered hopeless because of advanced age, very extensive tumour or poor general condition. More than two-thirds of the patients were between fifty and seventy years of age. The authors state that about 90% of the patients on admission had clinical and radiological signs of bone destruction, which must be regarded as an expression of rather late diagnosis. It is important that all physicians and dental surgeons who are responsible for the primary diagnosis should be completely familiar with the symptomatology of these tumours. It needs to be realized that the early symptoms are unspecific and that an X-ray film without signs of bone destruction does not exclude a malignant tumour. In operable cases combined surgical and radiotherapeutic treatment was used, and in inoperable cases radiotherapy only. Between 1940 and 1945, following pre-operative deep X-ray therapy to a relatively low dose, electrocoagulation combined with insertion of radium in

the operation cavity was carried out within from four to six weeks. Later pre-operative deep X-ray therapy in full dosage was given to an increasing extent, and a more conservative method of operative treatment was adopted, since in a fair proportion of cases no viable cancer could be demonstrated at operation. Since 1951 every individual patient has been seen jointly by the surgeon and radiotherapist. Every patient is submitted to an operation on the maxillary sinus, usually a Caldwell-Luc operation. In all cases a broad communication is established between the maxillary sinus and the oral cavity for the purpose of drainage and to make adequate inspection subsequently possible. Those patients whose tumours are considered operable receive pre-operative X-ray therapy with from 2000r to 2500r per field and are submitted to radical operation four to six weeks later. At the same time radium tubes are inserted in the operation cavity. In the clearly inoperable cases and borderline cases the patients receive deep X-ray therapy with about 3000r per field. Among all surgically treated patients (electrocoagulation having been combined with radiotherapy) the five-year cure rate is 40%. The absolute five-year cure rate is 23% and the relative cure rate 27%. As these tumours are relatively rare, it seems advisable to concentrate the treatment to main centres where sufficient experience can be collected.

#### Large-Volume Radiotherapy.

W. M. LEVITT (*Brit. J. Radiol.*, February, 1955) define large-volume radiotherapy as that radiotherapeutic procedure in which, by reason of the volume of tissue irradiated, the determining factor in dosage is the constitutional tolerance of the body and not the local tolerance of the tumour bed. They state that this technique is often known as the bath method, and the essential features are that the whole segment of the body which is irradiated is raised to a uniform dose. The dosage is built up cautiously over a period of five to seven weeks. This method makes quite severe demands on the constitutional tolerance of the patient, many blood examinations are required, and in many cases the patient is best treated in hospital. In spite of these disadvantages, the method is perfectly safe if used with due precaution; and provided the patients are properly selected, the results justify its use. The following examples are given of four different types of condition treated by this method: (i) lymphadenoma with enlargement of liver and spleen and an epigastric mass, (ii) seminoma with widespread abdominal metastases, (iii) adenocarcinoma of the ovary, (iv) lymphosarcoma (generalized). The authors state that it is important to form a clear idea of what can be achieved. For example, in seminoma with secondary deposits limited to the abdomen, long-term survivals can be obtained in a substantial proportion of cases; hence in these cases treatment should be given as soon as possible and up to the maximum possible dosage. This applies to advanced ovarian growths,

although the proportion of long-term results here is much smaller. On the other hand, in the lymphadenopathies treatment can be only palliative, and treatment is usually best deferred until symptoms are present or threatened, even though an abdominal mass may be present. The author lists the conditions for selection of cases for bath irradiation as follows: (i) the distribution of the disease must be suitable; (ii) the disease must be radiosensitive; (iii) in the progressive lymphadenopathies, the disease must be producing or threatening symptoms of sufficient gravity to merit treatment of this magnitude. There are contraindications to the bath technique. As to the general condition of the patient, unless he is actually moribund, treatment should still be considered if the above conditions are met. The blood picture is of great importance. In general, a low hemoglobin value, below 60%, is a contraindication to treatment unless the value can be raised by transfusion. Despite the widely held view to the contrary, leucopenia is not necessarily a contraindication to bath irradiation, even an initial count as low as 2500 per cubic millimetre. If the platelet count is below 120,000 per cubic millimetre, the chance of completing the treatment is probably small. It is important, however, that reliance should not be placed on any single element in the blood picture in assessing dosage and continuation of treatment. In particular, provided that the fall in the number of white cells is slow and steady, a total leucocyte count of 1400 per cubic millimetre can be regarded as a safe minimum. In assessing results, Levitt says that of patients suffering from the lymphadenopathies with extensive abdominal and intrathoracic deposits, at least 20% are able to return to a reasonably normal life for periods of up to two or more years.

#### Radiation Therapy for Recurrent Cancer of the Cervix Uteri.

M. V. HERIK AND R. F. FRICKE (*Am. J. Roentgenol.*, March, 1955) state that there is a widespread belief that in cases of carcinoma of the cervix if the primary treatment, whether by surgery or radiotherapy, is unsuccessful, further irradiation will be at best only palliative. They review the results of radiotherapy in the treatment of recurrent carcinoma of the cervix at the Mayo Clinic. The primary treatment might have been irradiation, surgery or a combination of both, and it was decided that for a lesion to be considered a recurrence an interval of at least six months should have elapsed between completion of primary treatment and the diagnosis of recurrent malignancy. A total of approximately 1200 cases of carcinoma of the cervix were reviewed. In 110 of these cases a recurrence was diagnosed and treatment by irradiation given. If at all possible treatment was by radium followed by deep X-ray therapy. Twenty-five patients (22.7%) lived more than three years after treatment of the recurrence, and 18 patients (16.4%) lived more than five years. The best results were obtained when recurrence took place in accessible areas (that is, uterus, cervix or vagina), but long-term survivals were also obtained



in parametrial recurrence and in one case of metastasis in the lumbar part of the spine. The authors regard these figures as far from good, but consider that it is justifiable in cases of recurrence to aim at further intensive treatment.

## RADIOLOGY.

### Subluxation and Deformation of the Cervical Apophyseal Joints in the Etiology of Headache.

A. Kovács (*Acta radiol.*, January, 1955) states that cervical cephalgia, most cases of migraine, "cervical migraine" and the upper cervical sympathetic syndrome are patterns undoubtedly belonging to the same clinical entity. One or more of the upper articular processes of the cervical vertebrae frequently become dislocated and compress the vertebral artery and the accompanying sympathetic nerve against the border of the foramen of the transverse process above. As a result of this, bilateral or unilateral headaches may occur. These headaches cease while the subluxation is being reduced by anteflexion-traction of the head. A film taken during this manipulation shows that the articular process has been removed from the transverse process. Similarly, inflammatory or degenerative changes in the small joints resulting in widening of the articular process may, by extension below the transverse process, cause contraction or circulatory disturbance of the artery and consequent headaches.

### Lobar Emphysema.

E. F. VAN EPPS AND D. H. DAVIES (*Am. J. Roentgenol.*, March, 1955) report two further cases of lobar emphysema. They regard lobar emphysema as not only an entity but also an acute respiratory emergency met with in infants and more rarely in children and adults. Clinically and radiographically it is an obstructive emphysema of varied aetiology. The following causes have been reported: redundant bronchial mucosa acting as a check-valve obstruction, deficiency in numbers or abnormal development of cartilaginous rings, compression by aberrant vessels such as the *ductus arteriosus* or *ligamentum arteriosum*, stenosed bronchi and trauma to the lungs incident to over strenuous resuscitative measures at birth. There are also reported instances in which no abnormality can be found. The clinical and X-ray interpretation of the findings may be misleading. The clinical story usually follows a pattern. A previously normal infant begins to have attacks of cyanosis with or without cyanosis. These attacks become more severe and alarming. Clinical examination reveals emphysema with decreased breath sounds, shift of the mediastinum and heart, and sub-sternal retraction. Infection is not present. Atelectasis or pneumothorax is usually suspected. Skiagrams of the chest indicate the correct diagnosis. An extensive degree of emphysema is demonstrated, lobar in distribution, producing compression of the adjacent lobes and shift of the heart and mediastinum to the opposite side as well as posteriorly

as the result, in the severe cases, of anterior herniation of the emphysematous lobe into the opposite hemithorax. The vascular pattern in the emphysematous lobe is distorted and separated, and is not as irregular and thin as the septa seen in cystic disease of the lung. The diaphragm is flattened, depressed and never elevated. The radiographic findings have been confused with pneumothorax, atelectasis of the opposite side, tension cysts, cystic disease, foreign bodies, diaphragmatic hernia, agenesis, and bronchial plugging by thick viscid mucus in asthma and fibrocystic disease of the pancreas. The decision to remove an abnormal lobe surgically depends on the clinical response of the patient. When the symptoms of respiratory embarrassment are severe, surgery is indicated. If the symptoms are mild, a policy of watchful waiting should be adopted, since the life history of solitary cysts indicates that spontaneous recovery commonly occurs.

### Aneurysmal Bone Cysts.

D. C. DAHLIN, B. E. BESSE, D. G. PUGH AND R. K. GHORMLEY (*Radiology*, January, 1955) state that aneurysmal bone cyst is a distinct benign pathological entity and that in approximately two-thirds of the cases it exhibits a characteristic radiographic picture. The pertinent findings include a circumscribed area of rarefaction, a soap-bubble or honeycombed appearance of the interior of the lesion, eccentric bulging of the cortex, which is usually disrupted, a peripheral delimiting thin shell of periosteal new bone and, in young patients, a location in the diaphysis adjacent to the epiphyseal cartilage. The microscopic picture is as typical as the gross. The main components of the picture are the innumerable cavernous vascular spaces, the supporting connective-tissue septa, the variable numbers of multinuclear cells (which are not essential to the diagnosis), the osteoid or "fibre" bone in the connective tissue and the layer of periosteal new bone. The sponge work of engorged blood-filled spaces of this type is observed in no other lesion. The lesions which may bear a certain resemblance to aneurysmal bone cysts, from the standpoint of the radiologist and the pathologist, include benign giant-cell tumour, haemangioma, fibrous dysplasia and simple bone cyst. Benign giant-cell tumours should be differentiated by radiographic means in most instances. Giant-cell tumours usually occur in the long bones, where they almost invariably arise in the epiphysis. They are relatively rare in persons less than twenty years of age. They have a marked tendency to recur, and in about 10% of cases they eventuate in metastasizing malignant growths. The two lesions can be distinguished with complete assurance only by pathological examination. Microscopically, giant-cell tumours have a homogeneous cellular stroma with numerous multinuclear cells and lack the characteristic cavernous blood spaces of aneurysmal bone cysts. Haemangioma may be distinguished radiologically from aneurysmal bone cyst in the vertebrae, in that the former shows characteristic vertical striations on the skiagram. The vertebral body alone is affected in most

cases, and the lesion may involve one, two or three vertebral bodies. Aneurysmal bone cysts do not show vertical striation. They usually occur in the vertebral body or neural arch, and involve only a portion of the vertebra and never more than one vertebra except by pressure erosion. They may erode contiguous structures, while haemangioma do not. Haemangioma, of course, lack the histological features characteristic of aneurysmal bone cysts. Fibrous dysplasia of bone may be differentiated from an aneurysmal bone cyst by the absence of cystic spaces filled with free blood. In rare instances, the X-ray appearance may be such as to defy differentiation, but in most cases the two lesions are distinguished with ease. The X-ray appearance of a unicameral bone cyst is usually characteristic, but it arises in the end of the diaphysis adjacent to the epiphyseal cartilage, and therefore in children it resembles the aneurysmal bone cyst to a certain extent. These simple cysts develop in childhood or adolescence and are usually found before the epiphyses have united. They occur in the metaphyseal portion of the shaft, causing fusiform widening of the affected segment. The margins are usually sharper than those of an aneurysmal bone cyst. The overlying cortex is usually thin but always intact, unless there has been a pathological fracture. For aneurysmal bone cyst, curettage is the treatment of choice.

### Intramural Diverticulosis of the Gall-Bladder.

W. D. ROSS, N. FINBY AND J. A. EVANS (*Radiology*, March, 1955) classify intramural diverticulosis of the gall-bladder into three grades of severity. In the first grade the diverticula extend to the muscular layer. This grade is not demonstrated by present radiographic methods. In the second grade the diverticula penetrate into the inter-muscular lacunae and are seen radiographically as fine linear shadows of contrast material adjacent to and paralleling the contrast material in the gall-bladder lumen. In the third grade the diverticula penetrate through the muscular wall into the underlying connective tissue, occasionally reaching the serosa. The radiographic picture is one of an irregular group of rounded densities about the lumen of the gall-bladder. All the patients were examined radiographically because of symptoms suggestive of cholecystitis. The chief complaints were right upper quadrant abdominal pain and intolerance to fatty foods. Nine of the 13 patients were women, and the age range was from twenty-two to fifty-seven years. In most cases the history was prolonged, with intermittent attacks. Four of the 13 patients had demonstrable cholelithiasis. It is felt that the intramural diverticula are related to inflammation and increased pressure within the gall-bladder. It is likely, therefore, that the progression of changes from Grade 1 to Grade 3 is accompanied by exacerbation of symptoms and the possible complications of acute inflammation, cholelithiasis and perforation. The visualization of intramural diverticula is therefore an indication for cholecystectomy.

## Special Articles.

### INCOME TAX RETURNS FOR MEDICAL PRACTITIONERS IN PRIVATE PRACTICE.

THE preparation of the income tax return of the average medical practitioner in private practice is quite a simple affair if his financial records have been properly kept throughout the year.

Cardinal rules for the recording of income and expenditure are as follows.

#### Income.

A receipt must be given for all moneys received.

The daily or weekly banking must agree with the total of the amounts shown on the receipt books for that period.

Cash received should not be used for making payments of any kind. It should be banked intact.

#### Payments.

As many payments as possible should be made by cheque, and the receipts when received filed in cheque order.

Cash payments should be made from a special amount drawn by cash cheque each week and recorded in a book kept for that purpose. The practitioner should insist on getting a receipt when possible.

Salaries for employees and drawings should be drawn each week by cash cheque.

Tax stamps for employees should be purchased every four weeks and immediately affixed to the tax stamp book.

#### Cash Book.

In order to facilitate the annual dissection of income and expenditure, it is advisable to use a multi-column cash book. The oft-recurring items are each given a special column.

#### Tax Return.

As a general rule, all moneys received from the conduct of the practice must be included as income, and all expenditure incurred (except that of a capital nature) is allowable as a deduction.

There are, however, certain items of expenditure peculiar to doctors which are treated in a special way. These are as follows.

#### Rented Premises.

When a doctor's home is used partly as a place of practice, one-third of the rental is allowable as a deduction, unless the practitioner can prove to the satisfaction of the Commissioner of Taxation that a greater proportion should be allowable. The charges for gas and electricity and other applicable expenses are similarly treated.

#### Freehold Premises.

The municipal, water and sewerage rates, insurance and repairs and maintenance on freehold premises used partly as a place of practice are also allowable to the extent of one-third, unless it can be proved that a greater proportion should be allowable. Gas, electricity and similar charges also come under this heading.

#### Note.

It should be noted that the balance of the charges for municipal and water and sewerage rates is allowable as a concessional deduction. If the rented or freehold premises are used wholly for professional purposes, then obviously the whole of the running expenses is allowable as a deduction.

#### Insurance.

Insurance on surgery furniture and equipment is wholly allowable, insurance on private furniture is not an allowable deduction.

#### Subscriptions.

Medical association subscriptions are allowable up to ten guineas for each association. Subscriptions for medical periodicals and journals are wholly allowable.

#### Post-Graduate Expenses.

Post-graduate expenses are not allowable if they are incurred for the purpose of obtaining a higher degree. However, they are allowable if incurred for the purpose of attending refresher courses or meetings designed to bring the practitioner up to date on modern methods and techniques. This applies to congresses, annual meetings of learned societies and study leave to other States and overseas.

#### Locum Tenentes.

The expenses of providing a *locum tenens*, such as salary, board and lodging, motor-car allowance, travelling expenses *et cetera*, are wholly allowable.

#### Motor-Car Expenses.

The Commissioner will deduct one-tenth of motor-car expenses as being applicable to private use unless the practitioner can prove, and indicates, otherwise.

#### Drugs and Dressings.

Drugs and dressings are wholly allowable.

#### Spouse of Practitioner as Employee.

When a practitioner's spouse is engaged in receptionist, clerical or other duties in connexion with the practice and is paid a salary for such duties, then the salary so paid is deductible, if: (a) the payment is *bona fide*, (b) the payment is actually made in cash, (c) the payment is a reasonable amount having regard to the duties performed and the award rates governing such duties, (d) the spouse has complete jurisdiction over the money.

#### Depreciation.

The following rates of depreciation are allowable on assets used in the production of income (*per annum*): (i) carpets, 10%; (ii) diathermy plant, 7.5%; (iii) doctor's instruments, replacements; (iv) high-frequency current machines, 7.5%; (v) hospitals: bedding, linen, crockery *et cetera*, replacements; furniture (not including partitions), 5%; (vi) electrocardiograph, 5%; (vii) furniture and fittings, 2.5%; (viii) library (medical), 5%; (ix) linoleum, 7.5%; (x) motor-cars, 15%; (xi) ophthalmic surgeons' plant, 10%; (xii) radium, nil; (xiii) radium plaques and needles, 10%; (xiv) Röntgen ray (X ray) equipment, 7.5%; (xv) typewriters, 10%; (xvi) other plant (not being in the nature of instruments), 7.5%.

#### Loss on Realization of a Motor-Car.

The difference between the depreciated value of a motor-car and the sale price is allowed as a deduction. Correspondingly, when the motor-car is sold above book value, the difference must be included as income, or at least as much as has been written off by way of depreciation in past years.

#### Concessional Deductions.

Concessional deductions are as follows: (i) life assurance premiums, maximum £200; (ii) deductions in respect of wife, husband, daughter-housekeeper, parents or housekeeper totally dependent, £130 (the deduction in respect of a wife is dependent on her income not exceeding £50 *per annum*); (iii) first child aged under sixteen years, or student child aged sixteen to twenty-one years, or invalid relative aged under twenty-one years, £78; (iv) other children aged under sixteen years, £52 for each child; (v) gifts of £1 and upwards to public charitable institutions wholly allowable; (vi) medical, dental, optical and hospital expenses, maximum £150 (maximum £30 for dental expenses); (vii) funeral expenses, maximum £30 each bereavement; (viii) rates on non-income-producing property—water rates, municipal rates and State and Federal land taxes paid in respect of private residence or other non-income producing property, wholly allowable; (ix) calls on shares—calls paid to companies and syndicates mining in Australia for gold, silver, base metals, rare minerals, or oil or carrying on afforestation, one-third allowable; (x) education expenses—amount paid for fees, fares, uniforms *et cetera* in connexion with the full-time education at a school, college or university, or from a tutor, of the taxpayer's children or dependants aged under twenty-one years, maximum £75 for each child or dependant.

#### General Advice.

When a practitioner does not know whether an item of expenditure is deductible, it is always good policy to include it with an explanation and let the Commissioner decide.

If a practitioner does not agree with the Commissioner's assessment, he must lodge an objection within sixty days. The time factor is important, as after sixty days he is "out of court". It is also important to lodge it in the correct written form, containing the objection, the grounds for the objection and the section under which it is made.

The return itself must be lodged before August 31 in each year unless a request for extension of time for lodgement has been made to the Commissioner and his approval received.

G. D. ALEXANDER, Accountant.

## Public Health.

### CHEMOTHERAPY IN TUBERCULOSIS.

THE following information is taken from a technical information bulletin on the chemotherapy of tuberculosis prepared for and circulated to medical officers of the Repatriation Department and the State Directors of Tuberculosis. It has been made available by the Chairman of the Repatriation Commission. It is a brief summary of data presented at the fourteenth Conference on Chemotherapy of Tuberculosis held by the Veterans Administration, Army and Navy, at Atlanta in February, 1955, and observations made at over thirty institutions and universities in the United States by Dr. Alan H. Penington, Consultant in Chest Diseases, Repatriation Commission Headquarters.

#### General.

The three most important drugs remain preeminent in treatment, namely, streptomycin, para-aminosalicylic acid, and isonicotinic acid hydrazide. There is a growing consensus of opinion that, of these three drugs, INAH is of the greatest value, streptomycin of next importance, and PAS a valuable asset.

Many other drugs are regarded as of limited but real value, whilst others appear to be relatively useless. They may be listed as follows:

**Pyrazinamide.**—Pyrazinamide is of little value alone, but in combination with INAH it is considered by some to be bactericidal rather than bacteriostatic. This view is not universally acceptable.

**Viomycin.**—Viomycin is administered in some cases in which there is clinical and bacteriological resistance to other chemical agents. However, it is generally agreed that this material is not a potent antituberculosis agent, although it may be of limited value as a "stand-by" when surgery is contemplated.

**"Terramycin."**—"Terramycin", either alone or in combination with INAH, is occasionally given in some centres, but its value appears to be very limited.

**INAH Compounds.**—INAH compounds of several types have been employed in small groups of patients, but they either are not so effective as INAH or have no definite advantages over the simple drug. When they are combined with other drugs (for example, in the form of "Streptohydrazide" or as "Streptomycilidene Isonicotinyl Hydrazine") the effect of the compound appears to be less than if the drugs are employed as simple substances.

**Calcium Benzoyl PAS.**—Calcium benzoyl PAS and other modified PAS compounds (for example, combination with an anion exchange resin) were described, but there does not appear to be any significant advantage in these combinations.

**"Cyclo-serine" or "Seromycin."**—One new drug, "Cyclo-serine" or "Seromycin", was reported upon. The drug, which is derived from *Streptomyces orchidaceus*, is difficult to purify, and the clinical trial reported from the Metropolitan Hospital, New York, was carried out with a relatively impure material. At present a controlled clinical trial of the drug is being carried out by the Veterans Administration, and a considered evaluation cannot as yet be made. The drug may be of value in treatment of tuberculosis, as it is certainly bacteriostatic *in vitro* and effective against organisms resistant to INAH. It is uncertain whether the drug has any marked therapeutic value, and certain patients receiving the material have shown severe toxic effects of a cerebral nature—evidenced as the onset of somnolence or lethargy, occasionally with major epileptic seizures. When further reports are received, some appreciation of the place of this drug in the treatment of tuberculosis may be attempted.

Combined streptomycin and dihydrostreptomycin is being used in one major centre, but there appears to be no advantage in such combination, and difficulties arise if there are any hypersensitivity phenomena in the patient. Its use is not recommended.

#### Drug Combinations.

A considerable volume of accumulated data on the various combinations of streptomycin-PAS-INAH was presented at Atlanta. This may be summarized as follows:

1. In original treatment cases, there is no statistically significant difference in the results of treatment, as assessed by sputum conversion, cavity closure and clinical improvement, between any dual combinations of drugs or treatment by triple drugs. If anything, there may be a higher apparent sputum conversion rate or more rapid response with the

combination of streptomycin-INAH. However, cavity closure occurred in the same proportion of cases at the same time, whether any two or all three drugs were used. There therefore appears to be no valid reason for the concurrent administration of all three drugs in pulmonary tuberculosis.

2. In re-treatment cases, that is, when relapse has occurred after a period since cessation of original treatment, the dual combinations gave just as satisfactory results (or unsatisfactory) as the triple drugs. However, relapse rates were high in this group, and significantly higher when there were multiple small cavities as contrasted with single large cavities.

3. Pyrazinamide and INAH in combination, compared with PAS plus INAH, in a small group of cases, appeared to be slightly more effective. However, because of the possible hepatotoxicity of PZA, under ordinary circumstances, its general use is not recommended.

4. ACTH combined with antituberculosis drug therapy is being more frequently employed, particularly in patients with fairly far advanced tuberculous disease or with meningitis. It appears to be more widely appreciated that, when ACTH is required in tuberculous disease because of those indications usually accepted in general medicine, the drug may safely be administered so long as there is adequate antituberculous drug therapy. This observation is not new, but its wider appreciation is of interest.

#### Drug Dosage.

It is fairly generally accepted that the adequate efficient dose of PAS is 12 to 15 grammes of the acid daily. At times, owing to intestinal intolerance or other features, specially prepared PAS may be administered intravenously, although such need rarely arises. All observers emphasize the patient variation in respect to tolerance to PAS, and this fact does at times limit the usefulness of the drug.

The standard dosage of INAH remains as 300 milligrammes daily. Certain workers suggest that a higher dose may at times be required and can be administered with safety. However, a higher dosage is rarely required in pulmonary disease unless there is a fair degree of resistance to the drug, and then the clinical effect is very limited.

Considerable differences of opinion still exist in regard to the dosage of streptomycin. Three commonly employed dosage schedules are: 0.5 gramme daily, one gramme triweekly, one gramme biweekly. Emergence of significant INAH resistance appears, on the Veterans Administration reports and on the Medical Research Council reports, to rise more rapidly and more consistently when one gramme of streptomycin is administered biweekly with INAH than on other dosage schedules. Because of these reports, biweekly administration of streptomycin is probably not as valuable as triweekly or daily administration of streptomycin. A considerable volume of authoritative opinion favours daily streptomycin because the emergence of resistant strains of organisms appears to be more delayed on this dosage, and it can therefore be effectively continued for longer periods. Its one disadvantage lies in the need for daily intramuscular injections, and this must be weighed in each case against the probable advantages of such a regime.

#### Duration of Drug Treatment.

The duration of drug treatment was succinctly expressed in the words: "It is easy to know when to start, but we do not know when to stop." The study of relapse rates after drug treatment indicates that conversion of sputum as assessed by culture techniques should not lead to discontinuance of treatment until at least twelve months have elapsed. It may be that drug therapy continued for eighteen months is as effective as treatment for a longer duration, but this is at present unknown and is conjectural. In general, drug treatment is rarely terminated voluntarily before eighteen months, and is frequently continued for longer periods.

Inevitably this has meant the continued administration of drugs at the out-patient level to selected patients, and this practice is now widespread. In the elderly, or the advanced "good chronic", who may have a "negative" sputum to culture whilst receiving drugs, the drugs may be administered indeterminately at the out-patient level.

The fact that drug treatment is now being continued for progressively longer periods, even after so-called "definitive surgery", would appear to be a clear indication that, despite the vast advances in treatment directly attributable to antituberculosis drugs, these drugs do not as yet provide the complete answer in the treatment of tuberculosis. In all centres visited it is apparent that many patients regarded in the past as successfully treated with drugs, or with surgery and drugs, are suffering relapse.



### Residual Lesions.

Whether it is necessary to resect residual lesions after prolonged drug treatment has not yet been completely answered. Over a period of two to three years the relapse rate, which is low in both resected and non-resected cases, remains the same for each group. Because of the necessary surgical risk in such resections, even though this may be small, resection of stable, non-cavitary and "bacillary negative" (to our tests) lesions is not widely advocated. However, and perhaps purely because of impressions, residual lesions of moderate extent (for example, involving one or more pulmonary segments) are more likely to be resected than those requiring subsegmental excision. Whether a residual lesion is or is not resected therefore remains discretionary on the part of the physicians and surgeons concerned, but there is in general a more conservative approach in the United States than one might have anticipated.

It has been conclusively demonstrated that, in certain cases of cavitary disease, prolonged drug therapy may result in epithelialization of a tuberculous cavity and failure to demonstrate, after resection, any tuberculous granulation tissue in the cavity wall. Despite this fact, and chiefly as a result of the inability of clinician or radiologist to predict this change or to determine when it has occurred, it is a sound general practice, where possible, to resect residual cavities even if the sputum examination findings are negative.

### Drug Resistance Studies.

Whilst it is universally appreciated that in-vitro studies of the resistance of a patient's bacillary population to anti-tuberculosis drugs cannot and should not be the sole determining factor in drug treatment, such studies are invaluable as an indication of the form of drug therapy most likely to be effective in any particular case. Studies of drug resistance do impose heavy work on the bacteriology laboratory; yet in any group studies, as well as in the management of an individual patient, these should be carried out before, and during, the course of treatment. The assessment of drug sensitivity of the organisms in a patient's sputum is more and more widely sought, solid media being invariably employed. In this field, further work is required in this department.

This bulletin does not refer to aspects of surgery or of non-tuberculous pulmonary disease. These will be discussed in a full later report which will further amplify data submitted here in summary for medical officers concerned in treatment of patients.

### Out of the Past.

*In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.*

#### THE KANGUROO.<sup>1</sup>

[From "A Complete Account of the Settlement in New South Wales", by Watkin Tench, Captain of Marines.]

We have killed she-Kanguroos whose pouches contained young ones, completely covered with fur and of more than fifteen pounds weight which had ceased to suck and were afterwards reared by us. In what space of time it reaches such a growth as to be abandoned entirely by the mother we are ignorant. It is born blind, totally bald, the orifice of the ear closed and only just the centre of the mouth open but a black score, denoting what is hereafter to form the dimension of the mouth is marked very distinctly on either side of the opening. At its birth the Kangaroo (notwithstanding it weighs when full grown 200 pounds) is not as large as a half grown mouse. I brought some to England even less which I took from the pouches of the old ones. The phenomenon is so striking and so contrary to the general laws of nature, that an opinion has been started that the animal is brought forth not by the pudenda, but descends from the belly into the pouch by one of the teats which are there deposited. On this difficulty as I can throw no light, I shall hazard no conjecture. It may however be necessary to observe that the teats are several inches long

and capable of great dilatation. And here I beg leave to correct an error, which crept into my former publication, wherein I asserted that "the teats of the Kangaroo never exceeded two in number". They sometimes though rarely amount to four. There is great reason to believe that they are slow of growth and live many years—this animal has a clavicle or collar bone similar to the human body. The general colour of the Kangaroo is similar to the ass: but varieties exist. The elegance of the ear is particularly deserving of admiration: this far exceeds the ear of the hare in quickness of sense: and is so flexible as to admit of being turned by the animal nearly quite round the head, doubtless for the purpose of informing the creature of the approach of its enemies: as it is of a timid nature and poorly furnished with means of defence, though when compelled to resist it tears furiously with its fore paw and strikes forward very hard with its hind legs. Notwithstanding its unfavourable conformation for such a purpose it swims strongly: but never takes to the water unless so hard pressed by its pursuers as to be left without all other refuge. The noise they make is a faint bleat, querulous but not easy to describe. They are sociable animals and unite in droves, sometimes to the number of fifty or sixty together: when they are seen playful or feeding on grass which alone forms their food. At such times they move gently about like all quadrupeds on all fours: but at the slightest noise they spring up on their hind legs and sit erect listening to what it may proceed from: and if it increases, they bound off on those legs only: the fore ones, at the same time, being carried close to the breast like the paws of a monkey: and the tail stretched out acts as a rudder on a ship. In drinking the Kangaroo laps. It is remarkable that they are never found in a fat state: being invariably lean. Of the flesh we eat with avidity: but in Europe it would not be reckoned a delicacy: a rank flavour forms the principal objection to it—the tail is accounted the most delicious part when stewed.

### Special Correspondence.

#### LONDON LETTER.

BY OUR SPECIAL CORRESPONDENT.

#### Your Correspondent Visits the United States of America.

YOUR correspondent's arrival in New York coincided with the commencement of the large-scale use of the Salk vaccine for the prevention of the paralytic form of poliomyelitis. The earlier announcement this year of the success of the nationwide trials in 1954, conducted by the University of Michigan, received immense publicity here, and plans were made to begin the immunization of school children before the onset of the poliomyelitis season this summer.

The early optimism of the general public was somewhat shaken by the occurrence of paralysis in vaccinated children in the first priority group (five to nine years). The number of cases of paralysis was small (134 to date), compared with the very large number of children vaccinated. The greatest number of these cases came from California and Idaho, from vaccine manufactured by the Cutter Laboratories. The reports of cases of poliomyelitis occurring in children who had received the first dose of vaccine created an anti-poliomyelitis scare, with consequent waning of public confidence in the Salk vaccine. In New York about 30% of eligible children failed to attend for vaccination, and a state of uncertainty existed throughout the country. To restore public confidence, the President of the United States and the Surgeon-General of the Public Health Service, Dr. L. Scheele, both made broadcasts, in which they expressed their confidence in the vaccine but stated that its issue would be temporarily suspended until further tests of its safety were made.

All stocks of vaccine produced by the six officially recognized manufacturers were examined by a committee of experts in Washington and new standards of safety devised. The "all clear" was given, and the immunization programme was recommenced, but it will not be completed this year. Most children between the ages of five and nine years will have received one dose of vaccine, sufficient to give some degree of immunity during the poliomyelitis season and to render them less likely to develop the paralytic form of the disease. It is generally considered that the incidence of poliomyelitis will not be affected this year, and many more cases of the non-paralytic form are likely to be reported. Dr. Salk, speaking to delegates of the World Health

<sup>1</sup> From the original in the Mitchell Library, Sydney.

Organization in New York this month, stated that his vaccine was designed to guard against paralytic poliomyelitis only. He did not claim to eliminate non-paralytic poliomyelitis, but predicted that, with his vaccine, there would be less paralytic poliomyelitis than ever before.

The findings of the committee of experts who examined the vaccine produced by the official manufacturers have not been made public, but the information given by Surgeon-General Scheele, of the United States Public Health Service, to the Convention of the American Medical Association at Atlantic City on June 7 indicate that there were inadequacies in theory and manufacture, which might have caused a national tragedy but for the action of the Government in suspending its use, until further safety measures were applied.

The Salk vaccine has been the subject of much controversy, creating confusion in the public mind, which was not allayed by charges of negligence against the Government and the health authorities for their handling of the immunization programme.

It is interesting to note that in Canada half a million children have been inoculated with Salk vaccine produced by the University of Toronto Connaught Laboratories without a single case of paralysis occurring. Medical authorities believe that the success of the Canadian programme is due to the extreme care taken to test the vaccine.

During the visit of the World Health Organization delegates to the New York Department of Health, Dr. Frandsen, Director-General of the Danish National Health Service, reported Denmark's experience with vaccine prepared by the State Service Institute according to the Salk method. He stated that there had been no complications or cases of poliomyelitis among vaccinated children. Denmark plans vaccination of her entire population under forty years of age by the end of the summer.

#### World Health Organization.

Following the eighth World Health Organization meeting in Mexico City, a group of 300 delegates from many nations recently visited New York to discuss with health officials such subjects as public health administration, biological standardization of vaccine and antibiotics, nutrition, mental health, blood banks, cancer and tuberculosis. Sessions were held at New York Hospital, Rockefeller Institute and Bellevue Medical Center.

#### Medical Care of the United States Armed Forces.

A recent report by a Committee of Inquiry adversely criticizes the Defence Department and the Veterans Administration for waste and inefficiency in the administration of service hospitals—particularly excessive hospital provision and the surplus of doctors in the armed forces. It draws attention to the over-generous payments to ex-service pensioners for minor disabilities and the provision of free medical care to ex-service personnel without regard to means. It points out that the average length of stay of patients in service hospitals was unduly long as compared with the same type of care in voluntary general hospitals.

Six years ago the Hoover Commission vigorously called attention to excessive hospital construction, and the present inquiry showed that since 1952 there has been a general decrease in the load on military hospitals, with an increase in the number of empty beds, while the construction of new hospitals continues.

The cost of these unused beds, based on normal hospital construction costs, is estimated at over one billion dollars, a sum which could be well applied to civilian hospital construction, of which the country needs about 812,000 additional State hospital beds. The closing of many military hospitals, as recommended, would release much-needed medical and technical personnel for civilian practice.

## Correspondence.

### USE OF HEXOBARBITONE FOR INDUCTION OF ANÆSTHESIA.

SIR: Since the time when it was first introduced thiopentone (marketed first as "Pentothal") has gradually displaced hexobarbitone ("Evipan") as the most used intravenous barbiturate in anæsthetic practice. However, we feel that for the purpose of producing unconsciousness prior to the administration of an inhalation anæsthetic (open drop ether or trichlorethylene) hexobarbitone is the better drug because it has a shorter duration of action. The period of

respiratory depression is shorter, and the tendency to coughing, breath-holding and laryngeal spasm is less. Thus the induction of inhalation anæsthesia is easier. Hexobarbitone is also less irritating locally than thiopentone, so that accidental extravascular or intraarterial injection is less liable to produce harmful effect. At present hexobarbitone is marketed under the names of "Evipan", "Cyclonal" and "Hexanastab". It is quite realized that thiopentone has numerous advantages over hexobarbitone, but for the occasional anæsthetist who wishes to give the patient the advantage of intravenous induction, hexobarbitone will facilitate a quieter swing over to the inhalation agent without the dangers of extravascular spill.

Yours, etc.,  
A. L. BRIDGES-WEBB,  
WILLIAM H. J. COLE.

Melbourne,  
June 5, 1955.

### ELECTROCARDIOGRAPHY AND THE NATIONAL HEALTH ACT.

SIR: I would like to bring before the notice of the profession a ridiculous anomaly which exists in section 19 of the *National Health Act, 1953*.

In this section, no benefit can be paid to private and intermediate patients in any section of a public hospital who has had an electrocardiogram performed by the hospital staff, and for which the hospital receives payment. I understand that the section, as written, also excludes pathological and radiographic investigations from benefit, but that as a result of representation to the Minister by sections of the profession, patients can now claim benefits for these latter investigations. However, for some obscure reason, electrocardiography by implication has been specifically excluded.

I have in mind a patient under my care, who was admitted to the St. George Hospital, Kogarah, in January, 1955, having had a coronary occlusion. Whilst in hospital, two electrocardiograms were performed, and a series of hematological investigations carried out by the hospital staff. Her hospital account included fees for all these services, but when her claim for reimbursement was dealt with by the Medical Benefits Fund, no benefit was paid in respect to the electrocardiograms, but all other investigations were paid for.

I have already written to the Minister protesting about this, and I feel that if sufficient weight of professional opinion be brought to bear, this ridiculous state of affairs can be rectified.

Yours, etc.,  
G. K. VINCENT.

Cronulla,  
New South Wales,  
June 9, 1955.

### THE RÖNTGEN ORATION.

SIR: I am sorry Dr. O'Day in his letter to THE MEDICAL JOURNAL OF AUSTRALIA, May 28, 1955, did not push his argument further when invoking the law of Nature in support of the scientific approach to the woes of the world. May I finish it for him?

In THE MEDICAL JOURNAL OF AUSTRALIA, January 22, 1955, a letter by Dr. Eric Goulston on "Gardening and Cancer" was a challenge to all—doctors, scientists, headmasters and all.

The human body is made to fit into an earthy environment—to work by the sweat of the brow, breathe in close communion with Nature, live side by side with plants and creatures, caring for them, giving and taking in a grand fellowship. But "mod cons", machines and mass medication have altered the picture. Man cannot live away from Nature—the rhythm is upset and metabolism is disturbed. Halfway products and immature forms appear with resultant abnormality and disease. The sensitive response of the cell at different stages of maturity to a certain stimulus is set forth in any elementary biology text-book, for example, the bending of leaf stalks towards the light when in flower, and a directly opposite action a little later, when the seeds are ripe and ready to be scattered towards the wall, in the case of the ivy-leaved toad flax. And this is done without the roar of machinery or the smoke of factory chimneys. We certainly need the wisdom of Solomon to consider the lilies.

There is nothing new in all this. Down through the ages we have been told, but we do not listen. Like the prophet of old, we shall find the answer not in the wind, or the earthquake, or the fire, but in the still small voice. Kipling was

not far from the truth in his cure for the "hump", to "dig till you gently perspire".

All creation works together. We have been told even the sparrows enter into the scheme of things. Martin Luther, on finishing his commentary on "all creation travelling together", turned to his little dog and said exultantly: "Thou, too, shalt have a little golden tail!"

The poets knew. Is it their sensitive appreciation of rhythm which makes them aware of the grand rhythm of all things?

Tennyson's

"One God, one law, one element,  
And one far-off divine event  
To which the whole creation moves."

Masefield's

"Slow up the hill the plow team plod,  
Old Callow at the work of God.  
Helped by man's wit, helped by the brute,  
Turning a stubborn clay to fruit."

And in Coleridge's "Ancient Mariner", not until he appreciates and loves the beauty of colour and grace of movement in the loathsome slimy creatures of the deep around him, does the curse fall from him and peace take its place.

Yes, love of our fellow man, self-sacrifice, the principle of the atonement—a law of Nature. "Up and down the whole of God's creation, the one law of life, the supreme condition of progress, the sole hope of the future, is Christ's law of the sacrifice of self" whether we like it or not. And man is the "creature of the borderland".<sup>(2)</sup>

Lastly, from the pen of a great scholar, who was nurtured in the legal profession, Evelyn Underhill.

"Yea, I have understood  
How all things are one great oblation made,  
He on our altars, we on the world's rood,  
Even as this corn,  
Earthborn,  
We are snatched from the sod,  
Reaped, ground to grist,  
Crushed and tormented in the mills of God,  
And offered at life's hands a living Eucharist."

And in that, for all who care to seek, with or without the aid of science, can be found the answer to the whole problem of pain and suffering.

*"Non nobis, domine, sed nomini tuo da gloriam."*

44 Briggs Street,  
Caulfield,  
Melbourne.  
June 5, 1955.

Yours, etc.,  
A. HORTON.

#### References.

- <sup>(1)</sup> "Life of Henry Drummond", by George Adam Smith.  
<sup>(2)</sup> "The Mystery of Sacrifice", by Evelyn Underhill.

#### A CANCER DETECTION AND PREVENTION CLINIC.

SIR: I appreciate the interest shown by Dr. Francis and Dr. Fay and Dr. J. R. S. Douglas in my review of a cancer detection and prevention clinic.

Dr. Fay is critical of the value of cancer detection clinics, and as he has had practical experience in such a clinic his views merit serious consideration. I consider that those attending these clinics should be told that a negative report means only that the existence of cancer is not evident at the time, and they should seek advice regarding any symptoms that may develop before their next regular visit to the clinic. If general practitioners would give their patients routine examinations similar to those made at the clinic, the results should be equivalent.

In reply to Dr. Douglas, the discrepancy he mentions in the numerical data is due to the failure to add to the normal smears the words "without pathology"; that is, the addition of 1146 (patients with one or more pathological lesions but with normal smears) to 2854 equals 4000. I can assure Dr. Douglas that the histological reports from the pathology department are of the highest standard. I know that in several instances outside opinions have been sought before the diagnosis of malignancy was made.

During the early months of the clinic's existence no check was made that those attending were symptom-free. After approximately 500 women had been seen, appointments were

given only to those who stated they had no symptoms of ill health.

Regarding the eleven cases of carcinoma of the cervix. In two instances the diagnosis was made of carcinoma *in situ*; the nine remaining were classified as carcinomata of the cervix, grades II or III. Three patients had symptoms of bleeding, one at the age of forty-four with a duration of five weeks, another at the age of sixty-one (duration eight weeks), and the third at the age of seventy-three (duration four months).

Yours, etc.,

229 Macquarie Street,  
Sydney,  
June 6, 1955.  
C. GRAHAM CRAWFORD.

#### PROLAPSED CORD TREATED BY CONTINUOUS MANUAL ELEVATION OF THE HEAD AND CAESAREAN SECTION.

SIR: With reference to the correspondence on prolapse of the cord, I would suggest that when immediate vaginal delivery is not possible the following simple and effective manoeuvre be carried out. Replacement of the cord with the fingers or with tape and catheter is difficult, because the cord, being soft and slippery, is hard to handle, but if it is wrapped in a small sterile towel, this mass is easily managed. The loop of cord wrapped in the towel is grasped in the hand or sponge holder and inserted into the uterus up above the head, which may be steadied by means of Willett's clamp. The towel is left there to be expelled with the baby and placenta. This treatment may not be completely aseptic, but it is a life-saving measure, and will avoid many unnecessary Caesarean sections.

Yours, etc.,

55 Collins Street,  
Melbourne,  
June 28, 1955.  
FRANCIS J. HAYDEN.

#### THE USE OF PAS IN RHEUMATOID ARTHRITIS.

SIR: I have been greatly interested in the original communication of Dr. Brian Haynes concerning PAS therapy in rheumatoid arthritis, as well as his reply to a number of critics in the recent MEDICAL JOURNAL OF AUSTRALIA (June 11, 1955). He rightly stresses the broad spectrum of treatment which he has found by experience to be efficacious in many cases of rheumatoid arthritis. Repeatedly over the years in THE MEDICAL JOURNAL OF AUSTRALIA I have stressed the necessity of a broad programme of therapy as one best calculated to produce the maximum benefit in most patients suffering from rheumatoid arthritis. As the originator of the prolonged low dosage sulphonamide therapy in rheumatoid arthritis I have pointed out that, although in my experience and also in the experiences of my colleagues, "Proseptasine" (benzyl sulphanilamide) is the best remedy, yet sulphadiazine, sulphathiazole and sulphadimidine, especially the latter, have given some extraordinarily beneficial results. In some cases the sulphones such as "Promacetin" or "Sulphetrone" are efficacious. We do not employ gold as often as we did six or seven years ago, but it is still a valuable remedy, especially in the low-grade periarticular variety of the disease and often deleterious in the vasospastic variety associated with severe weight loss. If "sulpha" therapy alone controls the disease, we do not employ gold, but may do so if the former is partially efficacious or if "sulpha therapy" is not productive of control of the disease if a recurrence occurs. We also employ salicylates, generally acetyl salicylic acid in dosage of 60 to 80 grains per day.

As regards PAS, we employed this drug by itself, but only observed a few good results. However, there is no doubt that the salicylates do act beneficially, and I do not think it matters which preparations are employed as long as dosage is adequate. As regards cortisone and ACTH, it must be remembered that Philip Hench regarded these remedies as only supplements to the therapy of the disease and not curative. I and my colleagues are certain that they have a place, but they must be employed only when all other treatment has failed to alter the disease. There is also a place for "Atebrin" and "Butazolidin" therapy in certain cases of rheumatoid arthritis. However, the plan adopted by myself and colleagues over the years has been to try initially the effect of low dosage "sulpha" or sulphone therapy with or without salicylic acid and use the other



remedies if necessary. Inarticular hydrocortisone is undoubtedly a valuable remedy in a number of cases where needed. I believe that the "sulpha" drugs suppress the production of antigen and thus diminish the antigen-antibody reaction which many suggest is the basis of the pathology of rheumatoid arthritis, whilst salicylic acid reduces the activity of fibrinolysin.

I agree with Dr. Haynes that the "sulpha", gold and salicylate therapy is a good combination and gives control of the disease in a large number of cases. However, there are still too many cases where the disease finally is the master in spite of all known remedies including the steroid and pituitary hormones. More research is needed on the antigen-antibody reaction and its possible occurrence in rheumatoid arthritis as well as the role of the fibrinolysin-fibrinolysin system and the spleen.

Only by imaginative concepts of the pathology of rheumatoid disease can we formulate new means of attack on the problem, enabling trial and time to be the final arbiters as to the validity of the concept and the sequential therapeutic procedures.

Yours, etc.,

135 Macquarie Street,  
Sydney,  
June 20, 1955.

L. J. A. PARR.

SIR: I am in complete accord with the opinion of John Shanasy concerning the publicity given the use of PAS in rheumatoid arthritis, and I agree that it is about time the public were informed of the state of affairs concerning this drug.

In 1950 and 1951 Dr. Hetzel and Miss Hine and also myself were investigating the mode of action of PAS, and an article was published by Hetzel and Hine in the July 21, 1951, issue of *The Lancet* (page 95). In this they suggested that the action of PAS, like other salicylates, was mediated by the pituitary and adrenal glands. We were also carrying out work to demonstrate the similar mode of action of PAS, aspirin and cortisone in diseases such as tuberculosis, rheumatic fever and rheumatoid arthritis.

In 1952, Dr. M. Brous, also of Adelaide, published an article in *THE MEDICAL JOURNAL OF AUSTRALIA* referring to the treatment of rheumatoid and osteoarthritis by sodium PAS. Tremendous publicity was given by the Press and also the radio, both at home and abroad, concerning his claims. Patients in this State, with various types of arthritis, whether rheumatoid or otherwise, were virtually demanding the drug. However, fortunately, this drug was removed from the free list except for cases of tuberculosis a little later.

PAS certainly appears to benefit, temporarily, some types of arthritis, but in my experience no case of "true" rheumatoid arthritis with coincidental tuberculosis who received the drug, obtained any lasting benefit of the arthritic condition.

As Dr. Shanasy said, headline news in the lay Press concerning subjects of this nature can cause untold harm, and on this occasion the rheumatoid population, at least in South Australia, were ready to accept some wonder cure for their disease. Their disillusionment should be now nearly complete.

Yours, etc.,

Morris Hospital,  
Northfield,  
South Australia.  
June 3, 1955.

R. MUNRO FORD.

[This correspondence is now closed.—EDITOR.]

#### SOLVENT HAZARDS IN THE DRY-CLEANING INDUSTRY.

SIR: In the article by R. G. Bourne published in your issue of June 11 there are inaccuracies relating to maximum allowable concentrations which should be corrected, since the values given for some of the solvents are too high and may be misleading, particularly in the case of carbon tetrachloride.

The American Conference of Governmental Industrial Hygienists (1954) in their list of threshold limit values for that year does not include white spirit, but since this is a petroleum distillate the value stated for gasoline (500 parts per million of air) could reasonably apply. Browning (1953) suggests 250 to 700 parts per million for white spirit, while in Victoria, the only State in the Commonwealth which has

taken legislative action to define maximum limits, the value for gasoline is 800 parts per million.

The American Conference specifies a value of 500 parts per million for Stoddard solvent, 200 parts per million for coal tar naphtha, 500 parts per million for petroleum naphtha and 25 parts per million for carbon tetrachloride. The values stated by the American Conference are for the maximum average atmospheric concentration to which workers may be exposed for an eight-hour working day without injury to health.

The Victorian Schedule, which has the general approval of the Committee on Industrial Hygiene of the National Health and Medical Research Council of Australia, specifies a limit of 25 parts per million for carbon tetrachloride.

Yours, etc.,

GORDON C. SMITH.

Industrial Health Unit,  
School of Public Health and Tropical Medicine,  
Sydney.  
June 23, 1955.

#### References.

- AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (1954), "Threshold Limit Values for 1954", *Arch. Indust. Hyg.*, 9: 530.  
BROWNING, E. (1953), "Toxic Solvents", Edward Arnold and Company, London.

#### CHELATING AGENTS.

SIR: In "Current Comment" in *THE MEDICAL JOURNAL OF AUSTRALIA* for June 4, 1955, on "Chelating Agents" there appear two statements or references which I think require further comment.

The article states (page 840, two lines from the top): "All observers . . . but they are unanimous in insisting that it is only the lead in soft tissues which is removed." (I presume, although calcium EDTA is referred to, that disodium calcium ethylene diamine tetraacetate is the substance meant.) At the present stage in our investigations we have very good evidence that considerable amounts of lead can be removed from the bones by treatment with this agent.

Lower down (line 39) appears the statement: "Kehoe points out that given orally it will be of little use since food normally contains enough higher metals to saturate EDTA." Our experience of a considerable number of cases is that the oral treatment of lead poisoning is effective. It produces a very marked increase (up to 35-fold) in urinary lead excretion. Incidentally, the quantities excreted in the urine are far greater than could be provided by the food ingested, and must come from the blood and other tissues. Sibury *et alii* (*Proc. Soc. Biol. & Med.*, 82: 226, 1953) and Cotter (*J.A.M.A.*, July 3, 1954) have also reported on the satisfactory oral use.

Yours, etc.,

D. O. SHIELDS,  
Chief Industrial Hygiene Officer.

General Health Branch,  
Department of Health,  
Melbourne.  
June 7, 1955.

#### AUSTRALIAN ABORIGINES AND THE MEDICAL PROFESSION.

SIR: The oration by Dr. C. G. McDonald stirred within me many memories of Dr. Stawell, the personal friend and medical attendant of my family throughout my childhood. Dr. McDonald calls on the profession to provide leaders such as Dr. Stawell, in thought and action in this favoured land.

I could not but feel that in our callous attitude towards the aborigines and half-castes how miserably we have failed to live up to the ideals of such a man as Dr. Stawell. In our country hospitals we find these people segregated into the worst wards of hospitals, not because of their diseases, but because of the colour of their skins. We tolerate the state of affairs where little children are placed in separate schools, or worse still, in separate desks at schools for the same reason.

As a profession we have made no concerted effort to help these unfortunate and despised people to obtain housing, education or suitable work. Neither have we tried to rescue the young and the old from degradation and poverty. We

have made no united effort to fight the drink problem, nor have we proposed any way to control syphilis and tuberculosis, which diseases were a present to them from the white man. These people will not cooperate voluntarily; they are as children and must be treated as such.

In fact, as in the tale of the Good Samaritan, we have closed our eyes and passed by on the other side. We welcome students from East Asia, and it is good that we should do so, but yet we do not open the doors of opportunity to those in this country, whom we have displaced. Individually many doctors, notably those in the Flying Doctor Services, give of their best to help the coloured people, but as a profession we have failed to give a lead in alleviating their tragic conditions.

Yours, etc.,

Armidale,  
New South Wales,  
June 14, 1955.

ELLEN M. KENT-HUGHES.

## Obituary.

### JOHN SIMEON COLEBROOK ELKINGTON.

We are indebted to Sir Raphael Cilento for the following appreciation of the late Dr. John Simeon Colebrook Elkington.

John Simeon Colebrook Elkington was born at Castle-maine, Victoria, on September 29, 1871, the elder son of J. S. Elkington, Professor of History in the University of Melbourne. When he died on March 8 of this year, at Mooloolaba, Queensland, where he had been living in jocular retirement for a long time, he was in his eighty-fourth year. Shrewd, urbane and tolerant by nature, he was forthright, vigorous and peremptory when occasion demanded it; an athlete by preference and training, he was also an aesthete—as much at home in judo kimino and belt or in the boxing ring or on ship's bridge, as in art gallery, social club, reporters' room, editor's sanctum or ministerial ante-room. Omnivorous reading, a retentive memory, a seeing eye and a passion for travel and inquiry developed a height of versatility from which he surveyed mankind with kindly cynicism, and often enough shot down the pretentious with a shaft of subtle wit. Withal he was an excellent judge of men, with a generous readiness to acknowledge the ability of friend or foe—he had few enough of the latter.

It was inevitable that his human interest and inquiring mind should lead him into medicine, and after graduation in his early twenties, he did post-graduate work abroad, and was an early explorer in the field of microscopic research. While on furlough in Australia from India, his experience of plague and smallpox—virtually unknown to Australian medical men of that day, as they are of this—resulted in an offer to assist during a local epidemic, and in 1906 to the Commission of Health in Tasmania. But the sun was in his blood, and he very soon moved north, succeeding Dr. Ham as Commissioner of Public Health for Queensland. Australia had recently become a Commonwealth, and though Section 51 of the Constitution limited the Federal health function to one word—"quarantine"—Elkington was the moving spirit that emboldened others to attempt a far more ambitious programme—nothing less, in fact, than a complete service in public health. Offered the head post in the newly constituted service in 1910, Elkington advised the appointment of the late J. H. L. Cumpston, ten years his junior, but a man whom Elkington recognized as having great organizational ability. And so it proved. He himself, transferring to Commonwealth from State service, became Chief Quarantine Officer, North Eastern Division (Queensland and the Northern Territory), with a tacit responsibility for tropical developments, academic and practical.

His artistic and literary activities had grown and multiplied. His name appears in almost every movement of importance in those fields in the early days of the century. He contributed paragraphs that maintained their excellence of standard to the *Bulletin* and other papers for over forty years; he introduced Norman Lindsay to J. F. Archibald when he was unknown; and greatly assisted the progress of the Dysons, Randolph Bedford and many another artist or literary figure. In Queensland he was one of a university group that included almost every outstanding figure of the 1920's and 1930's.

The Tropical Diseases Institute at Townsville had been established by local enterprise bent to the purpose by Bishop Frodsham in 1909. Its significance was obvious to those who

understood the trend of affairs and our geographical situation, but they were few. Elkington fought vigorously for its support, and ultimately, when it failed for funds, succeeded in saving it as a Commonwealth activity and reorganized it as the Australian Institute of Tropical Medicine. Cumpston, who, like many an official of the south-east corner of the continent, had a scotoma for the tropical north, reluctantly accepted Elkington's lead in this respect until the latter retired in 1928, but within a year had arranged to transfer the Institute's remarkable series of specimens, its library, its staff and its activities to Sydney, where its size was trebled, its costs were multiplied tenfold and its specific relation to the tropics was lost. The recent British Medical Association resolution at the conference at Townsville (1954) urging the resumption of its work there is only the last of a series over fifteen years, deploring that departure from the foresighted plans of the "old master", who assessed the inevitable menace of the Far East and its diseases accurately thirty years ago.



With the increase of Australia's responsibilities after World War I by the capture of German New Guinea, Elkington decided to make one great bid for the recognition of the needs of northern Australia and the island dependencies in a health and strategic sense. Assembling round himself a group of younger men of similar views, he urged the cause in season and out of season. The influenza epidemic of 1918-1919 had scared the public to unbutton its purse (progress in public health in Australia has several times been inspired by fright when all else failed). A complete reorganization saw finally in 1923 the establishment of the Division of Tropical Hygiene of the Commonwealth Health Service; a series of diagnostic and serum-selling laboratories (of which Queensland came ultimately to have most); the hookworm, malaria and filaria surveys and campaigns (1918-1930); and action for the coordination of quarantine practice throughout the territories, and ultimately throughout the Western Pacific (1926-1931). Elkington had himself surveyed the quarantine systems (or their lack) and the bills of health (some absurd) and other international conventional practices all over Europe, America and Asia. He prepared a handbook on quarantine administration that became a classic, and was favourably viewed and freely used, with and without acknowledgement, by several other national services. In 1920 public health had been deliberately made a major issue at the Australasian Medical Congress of that year by his efforts—aided now by the late F. S. Hone, of Adelaide, who was to become the third member of the propaganda team for public health in Australia. In 1921

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Elkington visited Malaya, the Dutch East Indies, Papua and former German New Guinea, seeking to correlate procedure and establish cooperative contact. In 1925 he went to Tokyo as Australian delegate to the Far Eastern Association for Tropical Medicine, and afterwards on tour sponsored by the (late) League of Nations, through Japan, Korea and Manchuria. In 1926 an attempt to inspire the Advisory Council of the Far Eastern Bureau of the League of Nations at Singapore, where one of Elkington's supporters (Dr. Park) was in charge, led to talks on coordination at Singapore, Manila, Shanghai and Hong Kong.

Meanwhile, his group here had prepared the International Pacific Health Conference at Sydney (December, 1926), where these attempts found expression in resolutions accepted by all the nations present.

But the weight was too heavy to lift. The apathy of Australian officialdom could not be dissolved by the enthusiasm of so small a group, despite the brilliance and vigour of its leader. After twenty years he had grown tired, and, moreover, in the clear sky of 1928 he read the portents of the economic blizzard of 1929-1933. Seeing one of his senior officers laboriously pinpointing a map of the "South West Pacific Regional Zone", a creation approved by the League of Nations, he said (like William Pitt in the Napoleonic wars): "Roll up that map: you will not need it these ten years!" In July, 1928, he resigned.

A few months later he sailed as ship's medical officer on a daring project of many years: he would cross the Andes and come down the Amazon. The ship was held up in New Zealand by the rumour of import restrictions and unexpectedly returned to Australia to seek cargo. He left it in New Zealand and tried for inclusion in a scientific party visiting Antarctica: the cruise was cancelled. By boat and caravan he rounded the world, and fished all the trout streams of repute in every country that included any. After several years of philosophical vagabondage, he reached Mooloolaba in Queensland, where in a small house he built on the stretch between the river and the sea he spent the rest of his life. A mild coronary occlusion fifteen years ago straitjacketed his overweening energy and led him back to the pleasures of philosophy, paragraphing and reminiscence with pipe and glass.

A friend of forty-six years summed him up adequately in the *Bulletin* (March 16, 1955) as follows:

Something has gone out of the country with the disappearance of his special type, which is nearly extinct. It is not easy to describe their quality. There was nothing meretricious about their learning or their views, their sturdy independence or their pride. Their zest for life was as real and solid as their own large square shouldered, well-muscled figures. . . . Men who were a little bigger than the rest of their race both mentally and physically and in breadth of outlook; pleasant companions looking at life leisurely and with half-amused detachment—but serious in their beliefs and convictions. They were a breed that, in the last two generations, had a great, if little observed, influence on the development of the national outlook and of Australia's confidence in itself and its future.

#### DOUGLAS GEORGE RENTON.

DOUGLAS GEORGE RENTON, M.B., B.S., F.F.A. (R.C.S.), F.F.A. (R.A.C.S.), D.A. (R.C.P. and S.), the first Dean of the Faculty of Anaesthetists of the Royal Australasian College of Surgeons, died at his home in Melbourne on May 2, 1955.

A colleague of long standing writes: Douglas Renton lived in his work. The rest of his story can therefore be told quite briefly. He was born at Parkville, Victoria, on March 9, 1899, and was educated at Scotch College and the University of Melbourne. After graduation in 1922, he held resident appointments at the Alfred Hospital (1922-1923) and Women's Hospital (1923-1924). In 1924 an attack of appendicitis resulted in adhesions, which entailed major operations in 1925 and 1937, and which left his health permanently damaged. He practised at Rochester, Victoria, from 1924 to 1928, and was thereafter invalided for a whole year.

In 1929 Renton set up in Melbourne as a specialist anaesthetist, a calling then deemed appropriate to the physically handicapped. He held the appointment of honorary assistant anaesthetist at the Alfred Hospital (1929-1930) and Melbourne Hospital (1930-1940). Subsequently, he became full honorary anaesthetist to the Alfred Hospital (1930-1946) and Austin Hospital (1930-1938). In 1946 he became part-time salaried anaesthetist to the neurosurgical unit of Mr. H. C. Trumble,

with whom he had been associated at the Alfred Hospital since 1930. Whilst he engaged in private anaesthetic practice until the last, the neurosurgical unit made ever-increasing demands upon his time and energy.

In due course Renton's unostentatiously good work brought him various distinctions. He joined the Australian Society of Anaesthetists at its inception, and became its Federal President in 1950-1951. The D.A. (R.C.P. and S.) was conferred upon him in 1939, the F.F.A. (R.C.S.) in 1950 and the F.F.A. (R.A.C.S.) in 1954. He took a prominent part in the formation of the Faculty of Anaesthetists of the Royal Australasian College of Surgeons, becoming its interim Dean in 1953 and its first constitutional Dean in 1954.

Douglas Renton's private life was happy and uneventful, being centred in his home. He was a proficient fitter and turner, maintaining a small machine shop and fabricating his own anaesthetic apparatus. His main relaxation from engineering was cabinet-making or, in his last years, boat-building. His life was an unceasing struggle against ill



health and anxiety; one may doubt, indeed, whether in his last decade he ever felt really well. These stresses culminated, early in 1955, in a cardio-vasculo-renal crisis which ultimately proved fatal. He is survived by his wife, by a son in medical practice, and by a daughter who is a trained nurse.

From the anaesthetist's angle Renton's career falls into four periods. The first (1929-1932) lay in the years when it was an uphill task to be a specialist anaesthetist in Melbourne. The city had but four such, including R. W. Hornabrook, F. W. Green, and Renton himself; it has now approximately ninety. The specialist of 1929 was necessarily self-trained, since there was none to train him. To his self-education Renton brought an inquiring mind, entire intellectual honesty and four years' experience of rural practice. He found the last-mentioned qualification so valuable that, when he became an examiner for the D.A. (Melbourne), he always deprecated the entry of young graduates into anaesthetics before they had obtained a sufficient background of general medicine and surgery. Renton's achievement in this period of his career was that he did as much as any to convince the surgeons of the day that specialist anaesthetics was both possible and desirable.

Renton's second period (1932-1945) was his most productive. He was the first Australian anaesthetist to adopt carbon dioxide absorption methods, and himself built a series of appliances for the purpose. This work was genuine pioneering, which left its mark upon the canisters, "dead-space" volume and valve-gear of the apparatus subsequently built commercially in Australia. Renton acted for many



years as unofficial adviser to the major manufactory of anæsthetic apparatus in this country. In 1938-1945 he performed a similar function for the Medical Directorate of the Australian Military Forces, and held the honorary rank of captain upon the reserve of officers of the Australian Army Medical Corps. He shared in the designing of the anæsthetic equipment used by the Australian expeditionary forces in the second World War, and helped to ensure its supply to units overseas.

In his third period (1945-1950) Renton held something of the position of an elder statesman. Whilst he continued to suggest improvements in the anæsthetist's equipment, his main work was done in fostering common sense in the rising generation of anæsthetists. In his final period (1950-1955) he had two major projects. The earlier of these was concerned with anæsthesia with ether and muscular relaxants, for which purpose he designed equipment. The project was less productive than the earlier one on carbon dioxide absorption methods, probably because he now lacked the physical energy for revision of his valve design. His major activity, in this period, was the formation of the Faculty of Anæsthetists of the Royal Australasian College of Surgeons. In this he was moved by a desire for uniformity in the training and certification of anæsthetists throughout Australia. It is probable that this activity will constitute his monument.

Douglas Renton was a very capable anæsthetist. His approach to the subject was essentially clinical, since, like most of his generation, he had received but little training in the basic sciences. He possessed, however, disinterested zeal, a critical mind and an authoritative knowledge of anæsthetic machine design. He was a sound clinical teacher in his earlier years, although the specialized nature of his neuro-surgical work later divorced him from teaching, especially of undergraduates. Whilst this gave him greater freedom in the development of his own projects, it deprived him of a certain stimulus. He disliked lecturing, so that his subject matter was usually superior to his delivery. He could, however, preside with dignity upon major occasions, as at the inauguration of the Faculty. He shared in the writing of two text-books, and was himself the author of several constructive papers. As a man he was unassuming and kindly, and he spoke ill of none. He had a pleasing, if rather sardonic, sense of humour. His life, however, was not conducive to humour; it was an incessant battle against ill health, in which he showed great fortitude. In him the speciality has lost a loyal servant and a well-balanced counsellor.

The following is a list of Douglas Renton's major publications:

- 1932: "Practical Anæsthesia", Sydney, Australasian Medical Publishing Company, Limited (in collaboration with the anæsthetics staff of the Alfred Hospital).
- 1937: "Gas Anæsthesia: The Closed-Circle Absorption Technique", *Anæsth. & Anal.*, 1: 9.
- 1938: "Gas Anæsthesia: A Critical Survey of Gas Anæsthetic Technique", *Australian & New Zealand J. Surg.*, 8: 74.
- 1946: "Anæsthetic Methods", Melbourne, Ramsay (in collaboration with R. H. Orton and G. Kaye).
- 1949: "Use of Plastic Tubing in Intravenous Therapy", *Australian & New Zealand J. Surg.*, 18: 215 (in collaboration with J. Sunderman); "Dead Space in Closed-Circuit Anæsthetic Apparatus", *M. J. AUSTRALIA*, 2: 51.
- 1951: "Aids to Easy Breathing", *M. J. AUSTRALIA*, 2: 531.
- 1952: "A Flexible Plastic Tube-Adaptor for High-Pressure Injections", *M. J. AUSTRALIA*, 1: 408; "Modification of the 'Oxford' Inflation Apparatus", *Anæsthesia*, 8: 104.

#### HAROLD GEORGE McQUIGGIN.

The following appreciation of the late Dr. Harold George McQuiggin has been supplied by one of his colleagues.

Generations of medical, science and veterinary science students will mourn the passing of the late Dr. H. G. McQuiggin, whose death occurred on March 9, 1955, at Jervis Bay.

In 1916 the Professor of Physiology at the University of Sydney (Sir Thomas Anderson Stuart) offered the late Dr. McQuiggin a lectureship, which he accepted, and he was on the medical staff of the University until 1950, when he resigned, thus terminating thirty-four years of service with the *alma mater* of higher education in this State. For some

years "Mac", as he was called by his intimate friends, was forced to take a heavy load of teaching in medicine, science and veterinary science, as well as students of massage (physiotherapists), and lectured to a class of optometrists at Sydney Technical College. He was also chief examiner in physiology for the intermediate and leaving certificate examinations. Dr. McQuiggin took part in the community life of the University; he mixed freely with the students, by whom he was highly esteemed, and he was affectionately known to most of them as "Danny".

For the five months preceding his death he was in private practice at Jervis Bay and also employed as part-time medical officer by the Commonwealth Department of Health. Through his life service was his watchword, and his memory will abide until "time shall be no more". Dr. McQuiggin is survived by a widow, one son and two daughters.

#### WILLIAM ARTHUR YOUNG.

The following appreciation of the late Professor William Arthur Young has been sent by Dr. Linley Hensell, Commissioner of Public Health, Western Australia.

It is with regret that we announce the death of Dr. W. A. Young, formerly Director of the Public Health Laboratories in the Royal Perth Hospital.

Professor Young came to Western Australia in 1947, on his retirement from the chair of bacteriology in the College of Medicine at Singapore. It was at this time that the Public Health Laboratories were transferred from the Public Health Department to a newly completed section of the Royal Perth Hospital, and there occurred an amalgamation between the hospital laboratories and those of the department, with Dr. Young acting as director of both.

At that time it was extremely difficult to obtain professional and technical staff. Nevertheless, in spite of these many difficulties, Dr. Young succeeded in organizing a pathological service to the hospital, this department and medical practitioners in the State, of a quality which was surprisingly high in the difficult circumstances. He took over new premises and, by alterations and adaptations, organized departments of pathology, histopathology, biochemistry, microbiology and hematology with insufficient staff and with considerable personal effort. In addition, Dr. Young was largely concerned in the planning of the additions to the laboratories in the west wing at present under construction.

These tasks were not easy, but Dr. Young's determination was such that he was not easily deflected from his course. On his retirement last year, he was able to hand over a well-organized laboratory section to his successors. It was with great regret that we heard of his early and sudden death, as we had hoped that he would still have had a considerable number of years ahead of him in which to enjoy his retirement.

### University Intelligence.

#### AUSTRALIAN VICE-CHANCELLORS' COMMITTEE.

##### Nuffield Dominions Trust: Appointments at Oxford Medical School.

The following information has been supplied by the Secretary of the Australian Vice-Chancellors' Committee.

Notice has been received from the Registrar of the University of Oxford that the University has decided to invite nominations from Australia for four posts in the Oxford Medical School.

The posts are as follows:

1. Two demonstratorships tenable in any one of the following pre-clinical departments: department of biochemistry (not less than three years), department of human anatomy, department of pathology (not bacteriology), department of pharmacology, department of physiology.

2. Two clinical assistantships tenable in any one of the following clinical departments: department of anæsthetics, department of clinical medicine, department of obstetrics and gynaecology (not more than two years), department of orthopaedic surgery, department of plastic surgery.

Note: The Professor of Clinical Medicine has asked that the following be brought to the attention of applicants: "A candidate will be expected to take an active part in

Acute  
Amoeb  
Anchy  
Anthra  
Bilhar  
Brucel  
Cholera  
Chorea  
Dengue  
Diarrhoea  
Diphtheria  
Dysentery  
Erysipel  
Filariæ  
Homologous  
Hydatid  
Infectious  
Lead P  
Leptospi  
Leptospi  
Malaria  
Meninge  
Ophthal  
Ornitho  
Paratyph  
Plague  
Polio  
Puerper  
Rubeola  
Salmonella  
Scarlet  
Smallpox  
Tetanus  
Trachoma  
Trichino  
Tubercu  
Typhoid  
Typhus  
Typhus  
Yellow

the routine teaching and out-patient work of my department. Our own research is concentrated on haematology, gastroenterology and metabolic disease, but there are good facilities within the division of medicine for research in neurology. The department of medicine is being rebuilt on the same site and the facilities for laboratory research will be severely curtailed during 1956 and 1957."

Note: Not more than one appointment can be made in one department.

#### Conditions.

No person shall be appointed to either post who does not intend to return to Australia for at least five years' work of a like nature.

The attention of married candidates is directed to the fact that accommodation in Oxford for the families of the persons appointed is still difficult to find and liable to be expensive, and the University cannot undertake to provide it. Although the trustees would not debar a married man from taking his family, he may find that it is better not to do so under present circumstances.

#### Tenure.

One demonstratorship and one clinical assistantship are limited to appointment for a two-year term. The other two posts may be for either a two-year or three-year term.

An appointment to the department of biochemistry would be for not less than three years, while appointment in the department of obstetrics and gynaecology would be for not more than two years.

In other departments appointments would be for either a two-year or three-year term provided that the overall nominations from Australia were consistent with the first two conditions specified above.

Applicants should therefore state clearly whether they would prefer a two-year or three-year appointment, and whether they would be prepared to accept a two-year appointment.

The persons appointed will be expected to take up their duties in the academic year commencing in October, 1955, if possible no later than January 1, 1956.

#### Emoluments.

The stipend will be for a single man £650 sterling per annum and for a married man £950 sterling per annum, subject in each case to United Kingdom income tax. Travel grant £300 sterling.

#### Applications.

Letters of application, in duplicate, supported by the Dean of the Faculty of Medicine in which the applicant trained or in the University with which the applicant is now associated, must be lodged with the Secretary of the Australian Vice-Chancellors' Committee, c/o Australian National University, Box 4, G.P.O., Canberra, A.C.T., by not later than Monday, July 25, 1955.

Further information as to the details of the conditions of appointment under the Trust is available from each of the Australian universities.

## Naval, Military and Air Force.

### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 23, of May 26, 1955.

#### PERMANENT NAVAL FORCES OF THE COMMONWEALTH (SEA-GOING FORCES).

**Promotion.**—Surgeon Lieutenant William Bearn Wilder is promoted to the rank of Surgeon Lieutenant-Commander, dated 10th April, 1955.

**Fixing Rates of Pay.**—Surgeon Commander Charles Anthony Downward, D.S.C., is paid the rates of pay and allowances prescribed for Surgeon Captain, whilst acting in that rank, dated 12th March, 1955.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED JULY 2, 1955.<sup>1</sup>

Disease.	New South Wales.	Victoria.	Queensland	South Australia.	Western Australia.	Tasmania.	Northern Territory. <sup>2</sup>	Australian Capital Territory.	Australia. <sup>3</sup>
Acute Rheumatism .. ..	4(1)	2(2)	1(1)	..	..	..	..	..	7
Amoebiasis .. .. .	..	..	..	..	..	..	..	..	..
Ancylostomiasis .. ..	..	..	23	..	..	..	..	..	23
Andrax .. .. .	..	..	..	..	..	..	..	..	..
Bilharziasis .. .. .	..	..	..	..	..	..	..	..	..
Brucellosis .. .. .	..	1	..	..	..	..	..	..	1
Cholera .. .. .	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus) .. ..	1(1)	..	..	..	..	..	..	..	1
Dengue .. .. .	..	..	..	..	..	..	..	..	..
Diarrhoea (Infantile) ..	1(1)	14(13)	3(3)	..	..	..	..	..	18
Diphtheria .. .. .	4(2)	2(1)	3(1)	..	31(28)	..	..	..	40
Dysentery (Bacillary) ..	..	9(9)	2(1)	..	1	..	..	4	16
Encephalitis .. .. .	1(1)	..	..	..	..	..	..	..	2
Filariasis .. .. .	..	..	..	..	..	1	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid .. .. .	..	..	..	..	..	..	..	..	..
Infective Hepatitis .. ..	46(15)	82(46)	..	9(7)	8(2)	5	..	..	150
Lead Poisoning .. .. .	..	..	..	..	..	..	..	..	..
Leprosy .. .. .	..	..	5	..	..	..	..	..	5
Leptospirosis .. .. .	..	..	..	..	..	..	..	..	..
Malaria .. .. .	..	..	..	..	..	..	..	..	..
Meningococcal Infection ..	8(4)	4(2)	2	1(1)	..	2	..	..	17
Ophthalmia .. .. .	..	..	..	..	..	..	..	..	..
Ornithosis .. .. .	..	..	..	..	..	..	..	..	..
Paratyphoid .. .. .	..	..	..	..	..	..	..	..	..
Plague .. .. .	..	..	..	..	..	..	..	..	..
Polymyositis .. .. .	2(1)	2(1)	2	5(4)	..	..	..	..	11
Puerperal Fever .. .. .	..	..	1	..	..	..	..	..	21
Rubella .. .. .	..	12(8)	..	3(2)	6(6)	..	..	..	..
Salmonella Infection .. ..	..	..	..	..	..	..	..	..	..
Scarlet Fever .. .. .	12(6)	22(12)	16(1)	7(6)	..	1	..	..	53
Smallpox .. .. .	..	..	..	..	..	..	..	..	..
Tetanus .. .. .	..	1	..	..	..	..	..	..	1
Trachoma .. .. .	..	..	..	..	36(4)	..	..	..	36
Trichinosis .. .. .	..	..	..	..	..	..	..	..	..
Tuberculosis .. .. .	36(25)	16(9)	12(8)	6(6)	8(7)	..	..	..	78
Typhoid Fever .. .. .	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne) .. .. .	..	..	2(1)	..	..	..	..	..	2
Typhus (Louse-borne) .. ..	..	..	..	..	..	..	..	..	..
Yellow Fever .. .. .	..	..	..	..	..	..	..	..	..

<sup>1</sup> Figures in parentheses are those for the metropolitan area.

<sup>2</sup> Figures not available.

<sup>3</sup> Figures incomplete owing to absence of returns from Northern Territory.

## AUSTRALIAN MILITARY FORCES.

**Australian Regular Army.***Royal Australian Army Medical Corps.*

The Short Service Commission granted to 3/40053 Captain (Temporary Major) D. Headley is extended until 2nd April, 1955.

3/40053 Captain D. Headley relinquishes the temporary rank of Major and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Central Command), 3rd April, 1955.

**Citizen Military Forces.***Northern Command.*

*Royal Australian Army Medical Corps (Medical).*—1/33122 Honorary Captain J. Bell is appointed from the Reserve of Officers, and to be Captain (provisionally), 24th January, 1955. To be Lieutenant-Colonel, 29th March, 1955: 1/43714 Major (Temporary Lieutenant-Colonel) T. R. Biggs.

*Eastern Command.*

*Royal Australian Army Medical Corps (Medical).*—The following officers cease to be seconded for post-graduate studies in the United Kingdom, and are transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Eastern Command) in the honorary rank of Captain, 5th April, 1955: Captains (provisionally) 2/127030 C. A. Shearer and 2/130106 H. L. Thompson.

*Southern Command.*

*Royal Australian Army Medical Corps (Medical).*—To be Lieutenant-Colonels, 5th April, 1955: Majors (Temporary Lieutenant-Colonels) 3/101811 T. K. Durbridge and 3/77537 G. G. Harkness.

*Western Command.*

*Royal Australian Army Medical Corps (Medical).*—The provisional rank of 5/26523 Captain G. R. A. Raad is confirmed.

*Tasmania Command.*

*Royal Australian Army Medical Corps (Medical).*—6/15383 Captain (provisionally) J. F. Correy relinquishes the provisional rank of Captain and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Tasmania Command) in the honorary rank of Captain, 1st March, 1955.

**Nominations and Elections.**

The undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Huxtable, Bernard Ralston, M.B., B.S., 1954 (Univ. Sydney), 42 Moruben Road, Mosman, New South Wales.

Walker, Keith Bernard, M.B., B.S., 1951 (Univ. Sydney), 63 Fullerton Street, Stockton, New South Wales.

**Notice.****QUEENSLAND MEDICAL WOMEN'S SOCIETY.**

It has been decided by the Queensland Medical Women's Society to establish a prize in memory of the late Dr. Jean and Dr. Joyce Stobo, to be awarded to the woman student who gains first place amongst the women students in final year medicine at the University of Queensland. Donations should be made out to "The Stobo Fund", and addressed to the Honorary Treasurer, Dr. Marie Horn, 137 Wickham Terrace, Brisbane.

**ARTHUR WILSON MEMORIAL LECTURE.**

PROFESSOR BRUCE T. MAYES, M.V.O., F.R.C.O.G., will deliver the second Arthur Wilson Memorial Lecture at the Royal College of Obstetricians and Gynaecologists Lecture Hall, 8 Latrobe Street, Melbourne, on Friday, August 5, 1955, at 8.30 p.m. The title of Professor Mayes's lecture will be "The

Way of an Obstetrician". The subject will be the management of toxæmia with particular stress on the prevention of eclampsia. A cordial invitation is extended to all members of the British Medical Association to attend.

**ROYAL AUSTRALIAN AIR FORCE MEDICAL OFFICERS' SERVICE DINNER.**

As accommodation for the dinner at the Royal Australian Air Force, Richmond, New South Wales, on August 23, 1955, is limited, it is requested that all Royal Australian Air Force or ex Royal Australian Air Force members desirous of attending signify their intention to Dr. J. Witton Flynn, 183 Macquarie Street, Sydney, as early as possible. Only when members attending are known can transport and seating accommodation be finalized. It will be assumed that members who do not notify Dr. Witton Flynn by August 4, 1955, do not desire to attend the function.

**Diary for the Month.**

JULY 26.—New South Wales Branch, B.M.A.: Ethics Committee.

JULY 27.—Victorian Branch, B.M.A.: Branch Council.

JULY 28.—New South Wales Branch, B.M.A.: Branch Meeting.

AUG. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.

AUG. 3.—Western Australian Branch, B.M.A.: Branch Council.

AUG. 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

AUG. 12.—Tasmanian Branch, B.M.A.: Branch Council.

**Medical Appointments: Important Notice.**

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

*New South Wales Branch* (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

*Queensland Branch* (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

*South Australian Branch* (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

*Western Australian Branch* (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all contract practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

**Editorial Notices.**

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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